THE ENGINEERING AND MINING JOURNAL.

VOL. IX.—NO. 22.—THIRD SERIES.] NEW YORK, TUESDAY, MAY 31, 1870. [SINGLE COPIES 10 CENTS.

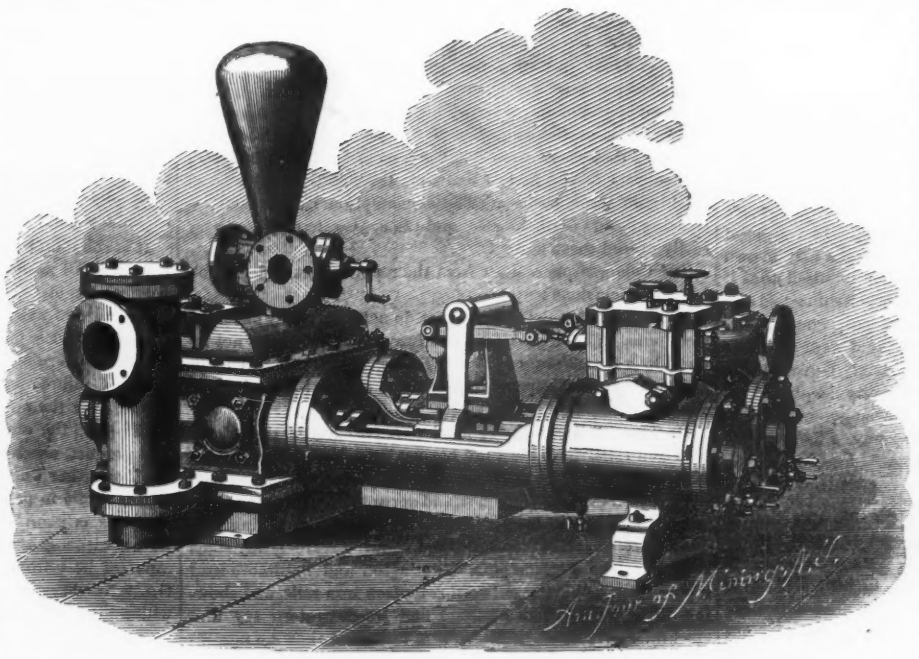
The Duplex Pump.

IF it is desired to use a steam-pump without any fly-wheel, there are certain difficulties to be overcome in the operation of the slide-valve, owing to the fact that such an engine has no momentum, and acting constantly against the incompressible fluid at a uniform pressure (due to the height of the water column, or the pressure in the air chamber) is liable to stop at the end of each stroke, for want of the power to carry it over the dead-point. This difficulty was ingeniously overcome in the old Worthington steam-pump, by an arrangement which relieved the pump-piston of its load just at the moment when the power was needed to move the slide-valve in the steam chest. As all engineers are aware, the valve-action in that pump, the pioneer of its class, was produced by arms from the main piston-rod, acting upon tappets screwed upon a valve-rod placed parallel with the former, and above it. The result was a peculiar movement of the main piston-rod, which paused an instant at each end of its stroke, allowing the valves to seat themselves. The original Worthington patent has expired; but many of the machines built under it are still running, and doing excellent service. Take them all in all, they are hard to beat, in many of the essential requirements of steam-pumps.

But the principle of the duplex pump, as now manufactured by the same firm, is far more perfect and beautiful. In this machine, two cylinders are placed side by side, and the piston-rod of each operates, by means of a rock shaft and appropriate connections, the steam-valve of the other. Each engine drives its plunger at a perfectly uniform speed throughout its stroke, at the end of which it pauses, until its own steam-valve being opened by the motion of the other piston-rod, admits steam to its cylinder, and enables it to reciprocate. This pause permits the complete seating of the valves.

The duplex pump as here represented, is of course a high pressure engine. When there is no fly-wheel or weighted plunger to store up power, it is necessary to maintain a full pressure to the end of the stroke. The incompressible water must be, as it were, steadily pushed, not propelled with blows. This is secured by the double action of the plunger in the pump, which works through a diaphragm, alternately sucking and forcing, and at every stroke both sucking and forcing.

But Mr. WORTHINGTON'S most brilliant achievement is the application of the principle of expansion to the duplex pump, which, as we have said, seems to exclude it. This he has accomplished by adopting the WOOLF arrangement of two cylinders, one high-pressure and the other low-pressure, and the former exhausting into the latter. The mean pressure in both is a constant quantity, and thus the economical advantages of expansion are secured without sacrificing the uniform piston speed which forms a cardinal feature in all Worthington pumps. This beautiful combination has given birth to some of the most remarkable pumping engines for water-works in this country. We shall be able to explain it more fully to our readers when we lay before them the elaborate engraving of the Newark water-works engine now in preparation.



WORTHINGTON'S DUPLEX PUMP.

Sulphuric Acid Works on the Hudson.

VOYAGERS up the Hudson this summer will observe, just after entering the Highlands and rounding the rock point called St. Anthony's Nose, the tall chimney, the buildings and deck of the extensive works now being rapidly erected on one of the low islands which at this point line the right bank of the river. Until recently, oil of vitriol, or sulphuric acid, so largely employed in the arts and manufactures, has been obtained from sulphur imported from abroad. The sulphur to be used at these works is obtained from the hills close at hand, in the shape of iron pyrites, or sulphuret of iron, of which a large deposit is being worked. One of the principal objects of the factory is to produce sulphuric acid in quantity to meet the demand for superphosphate of lime, in the manufacture of which it is used to render the phosphoric acid of crude phosphate soluble and fit for use as a fertilizer. These works are, in fact, designed to introduce to the bonds of chemical wedlock two crude, inert substances—the sulphur ores of the Hudson river and the phosphates of South Carolina—and to render them jointly capable of being vastly more useful than in their present condition. The means by which this is done would require a long description to render it intelligible to the general reader. We must be content with stating, that by the time the crude pyrites have passed through the vitriol kilns and chambers, and the crude phosphate has been milled and manipulated, they will have undergone a transformation which will render them active agents in producing a material as unlike either of them as could be imagined, namely, cotton; for to the use of superphosphates we are becoming more and more indebted for the successful cultivation of the great staple. The works already appear quite ornamental, and will be conducted so as to escape the reproach under which chemical works so often labor, that of smelling bad, though extreme care in that respect is hardly necessary, as the works are so situated that the only nose which they could possibly offend would be St. Anthony's.—*Iron Age.*

Explosions and Fire Damp.

A PUBLIC lecture was given in the town hall at St. Helen's, Lancashire, England, December 27, 1869, and repeated at Rothwell, Yorkshire, February 21, 1870, by Mr. WM. HOPTON, author of "Conversations on Mines between a Father and Son." Mr. HOPTON treated the "reflective power," and other useful properties of the atmospheric air; its "composition;" the "properties" of each component part of the air; the "mixture" of the components; the effects which would be produced if the mixture were altered; the weight of each of the compounds; the expansion, contraction, and elasticity of the air; the weight or pressure of the air; the cause of the variation in the weight; how mines are effected with gases by its variation in weight; the cause of one mine discharging more gases than another; why mines vary in the "quality" of gases discharged; the weight of gases discharged, and how it affects mines; the composition of fire-damp, and after-damp; the explosive mixture; Stephenson's safety-lamp, why it is extinguished in an explosive mixture of fire-damp; what we are to understand by ventilation; the several powers of ventilation; the (distribution) ventilation currents; the danger of one mode of ventilation, and safety of another; when mines are in the greatest danger; how the power of an explosion may be diminished; the friction of the air, and how it affects the ventilating currents. Fire-damp was exhibited and exploded, and its appearance shown also in the safety-lamp at the time of an explosion therein. The price of admission was only six pence, and the profits of the lecture were given to the "Young Men's Mutual Improvement Class." The delivery of such lectures for the instruction of the miners and the public is an excellent thing, and we wish some of our competent American engineers would imitate Mr. HOPTON'S example.

The Explosion of the Blast Furnace of the Vesin-Aulnoye Company, at Pont Fleury, France.

UNDER the above heading, the *Berg und Hüttenmännische Zeitung*, of April 29, gives the theory of this fearful explosion, according to F. C. GLASER, engineer, of Paris. He says:

"Explorations of blast furnaces are, in the present state of siderurgy, fortunately, of rare occurrence; but if they do happen, it is certainly worth while to enter into close investigations of the causes, and of the observed phenomena. To science, as well as practice, their publication is of the highest interest. For the former, they may confirm existing theories and accepted hypotheses, and for the latter they will serve as warnings against the consequences of carelessness.

"The blast of the furnace at Pont Fleury is a hot blast, the tuyères being kept cool by circulating water, supplied from a reservoir containing two hectolitres, and located in close proximity to the tuyères. This tank burst suddenly from unknown causes on the night of April 5th, and all the water rushed into the furnace. The workmen, who were very much alarmed at first, took flight, and remained hidden for some time; but nothing extraordinary taking place, they soon returned, thinking that the quantity of water had not had any effect on the running of the furnace.

"About a quarter of an hour had passed after the bursting, when all at once a fearful explosion hurled the hot, molten masses out of the furnace, scattering them in all directions. The charging-hoist, which was covered with tar, caught fire at once; and the four workmen near the tunnel-head could save their lives only by running through the fire, the effects of which severely wounded them. By prompt outside help, the fire was now extinguished, and the immediate damage limited to the relatively small sum of 25,000 francs. The time between the rupture of the water-tank and the explosion estimated, at a quarter of an hour, presents, certainly, a singular phenomenon, and as such, deserves some explanation.

"Among the many explosions of steam boilers, we have had one which was caused by the passage of the water into the spheroidal state. LEIDENFROST, and after him, KLAPPROTH, have furnished interesting treatises on this topic, which have since been perfected by the researches of BOUTIGNI, and are known under the name of the 'calefaction theory.' It is founded on the supposition of a perfect destruction of adhesive tendency of the fluid, when in the spheroidal state, to the hot surface of the metal. It is a well-known fact, that the capillarity of fluids is entirely modified by heat, and that, as shown by BOUTIGNI'S experiments, real contact cannot take place. It is easy to satisfy any one of this by a simple experiment. When a few drops of water are poured upon a red-hot metallic body, they are divided immediately into many small balls, which, dancing up and down with astounding celerity, are only changed into steam when the temperature has decreased to 150 degrees, centigrade. The formation of steam then takes place suddenly, and the tension may rise in this case to 1,000 atmospheres, which is equivalent to the pressure of 1033 kilogrammes per square centimetre, which is exerted, just after the ignition of gunpowder, upon the walls of the space in which it is confined.

"A similar phenomenon undoubtedly took place in the interior of the furnace. We are certain that this is the only way by which the interval of time between the flow of the water into the hot furnace and the explosion can be satisfactorily explained."

Load-draught of Merchant Ships.

Read before the British Institute of Naval Architects, by W. W. RUNDELL.

THE proper draught for a merchant vessel, said the author, is not a question to be determined in the first place by science, but by experience. Science may lend her aid in defining and generalizing the results of experience, but must unhesitatingly accept the dicta of those whose position and long practice make them the real arbiters of the question. The naval architect and ship-builder must bow, like others, to the decision of these experts. The load-draught cannot be arbitrarily fixed by the naval architect. LLOYD'S rule, three inches to the foot depth of hold, or the scale of the underwriters, may be quoted; but these bind no one. LLOYD'S rule was a suggestion only, and it was made when iron ships were just being talked of, and when few ships, except East Indiamen, exceeded seven or eight hundred tons, and it has never been recognized by Lloyd's Committee, except as an approximate guide for the loading of certain classes of vessels. The Liverpool scale is only intended for first-class vessels, and is subject in all cases to the judgment of the surveyor, who is influenced by the age and class of the vessel, its general proportions, the intended voyage, the

nature of the cargo, and other circumstances favorable or otherwise. The experts who practically rule in these matters are certain surveyors more or less intimately connected with the underwriting bodies, and who, if not practically appointed by ship-owners, have secured their confidence. Their great experience enables them to judge very closely as to the draught of water at which a ship begins to damage her cargo or becomes otherwise unsafe. Wooden vessels are now passing away, and iron sailing ships are being largely superseded by steamers. Iron sailing vessels will in future be chiefly employed in long voyages, and new ones will probably be of large size. As regards iron vessels, therefore, considerations depending on their age, the nature of the voyage, the season of the year, as affecting their load-draught, may be omitted nearly altogether. Considerations arising from the kind of cargo may also be omitted, as it is generally acknowledged that, with proper care, and by incurring the expense necessary for making good stowage, any proportion of dead weight may be safely carried. There remain only those conditions which relate to form and proportion, and these, I submit, are sufficiently represented by adopting the customs' measurements and registered tonnage. The suggestion that three-tenths of the whole displacement is a proper proportion for buoyancy, was made years since by Mr. J. JORDAN. The author then proceeded to refer to various tables bearing on the subject of his paper; and alluding to the requirement of more free side for large wooden ships than for small ones, he said that the reasons assigned for it were not applicable to iron ships. Large iron ships can be as strongly built as small ones. There can be little objection to the three-tenths displacement scale for ascertaining when a sufficient quantity of cargo has been placed on board a vessel. But it makes no allowance for extreme length, or for the length and character of the waves which she may enconnter. The surveyors state that the extreme length in proportion to a vessel's other dimensions, must be considered; but, so far as I am aware, they have not defined to what extent. Like the surveyors, I have not come to any definite opinion on this subject, but wait for better instructions. Like other scales which point out, with more or less exactness, what is the proper load-draught for a vessel, they leave us in ignorance as to what amount of departure from it will render a vessel relatively unsafe or practically unworthy. After some observations as to the desirableness of some mode of ascertaining the point at which a ship becomes dangerously laden, the author concluded with the following practical suggestion: "Let a round spot, nine inches in diameter, be conspicuously painted on every vessel over three hundred tons register, on each side, midships, at a point through which a horizontal plane would pass which would cut off the upper one-fourth of the vessel's registered tonnage when she is on an even beam. This would be useful in indicating pretty accurately when three-tenths of the whole vessel are out of water. In vessels of about five hundred tons this mark should be fully its own diameter above water. In vessels of seven hundred and fifty tons it would be one and a half its own diameter above water. In vessels of fifteen hundred tons it would be two diameters above water; in larger ships two and a half diameters. Here no kind of instrument would be required to make the observation. If the spot were very near the surface of the water the ship would certainly be very badly laden; if it touched the water she would be very deeply laden; if immersed or out of sight she would be dangerously laden. This would not hurt the ship-owner in any way. The proposed mark would indicate a fact, not an opinion.

A New Interest.

It is said that a manufactory will soon go into operation at Mauch Chunk, designed to prepare the coal dust and siftings at the collieries into a merchantable fuel. Many experiments have been made during the past few years, to utilize the vast mountains of screenings which are to be seen at the entrances of the extensive collieries, but generally the results have not been very satisfactory. These experiments have mostly consisted in mixing coal tar with the dust, and, after thorough trituration, moulding it into blocks under pressure. The machinery to do this was expensive, and the coal tar not to be had usually in quantities sufficient and at rates sufficiently cheap to enable the experimenters to put the coal-dust blocks into market at rates low enough to sell, and, at the same time, high enough to be remunerative to themselves. Probably the Mauch Chunk factory people have overcome all obstacles. If they have they will have a "big thing" on hand which cannot fail to be very profitable to them.—*Pottsville Standard.*

Horse Cars in London.

THE American system of street locomotion was introduced into the metropolis of Great Britain on the 9th inst., by the opening of two miles and a half of tramway, extending from Whitechapel Church to Bow Church in Cheapside, thus passing through the centre of the city proper. A tramway is substituted for the rail, which is thought to be an advantage, at least in relation to the general carriage traffic. The cars are constructed to convey twenty-two within and twenty-four without. These are to be all seated, and an infringement upon this arrangement will be punished by fine. According to the provisions of the Act of Parliament permitting these carriages, workmen are to be conveyed, at stated hours morning and evening, at the fare of one penny—two cents—a tribute to labor in large cities as worthy of a republic as of a Monarchial country.—*Insurance Journal.*

The Wilson Steam Stamp Mill.

THE first quartz mill for the San Diego mines, Cal., which was sent per steamer Oriflamme, is one of Wison's steam stamp mills. This is to be put up in the Julian District for working on custom ore, and will be in operation within two weeks. It is calculated to crush twenty-five tons daily.—*S. F. Scientific Press.*

Steel Rails.

THE Report of the Massachusetts Railroad Commissioners, made in the middle of February to the President of the Senate of that State, is a most useful compilation of the facts thus far elicited in American practice, with regard to the qualities and economical bearings of steel rails. The Commissioners received replies from fifty-seven roads, twenty of which have made no trials of steel rails; eleven had tried only a few, by way of experiment, and find them, so far, greatly superior in durability to iron rails in similar situations. The remaining twenty-six roads have laid steel rails in amounts varying from 100 to 15,000 tons; and their reports are generally very much in favor of the use of steel rails, especially where the track is subject to very heavy service, The rails vary in weight from fifty-two to sixty-seven pounds per yard, and are from various manufacturers, both in Europe and this country—all of them, however, doing very good service. The cost of steel rails, as given in these replies, varies from 50 to a little over 100 per cent. more than the cost of iron. We tabulate as follows some of the facts reported by the Commissioners:

Name of railroad.	Tons of steel rails.	M'nths in use.	Tons steel-headed rails.	M'nths in use.	Miles of both.
Eastern, Mass	410	12	..	..	4
Boston & Maine	100	30	10	40	1
Boston & Albany	1,200	42	50	..	12
Boston & Providence	1,400	46	5	48	15
Old Colony	135	60	..	48	1
Vermont Central	100	30	..	..	1
Ogdensburgh	20	10	..	..	..
Connecticut River	435	48	30	36	5
New York and New Haven	5,500	36	..	..	56
Erie	8,509	30	3,000	..	115
Camden & Amboy	1,500	30	..	..	17
North Pennsylvania	550	48	100	..	7
Philadelphia & Germantown	350	48	..	..	4
North Central Pennsylvania	300	40	..	..	3
Lehigh & Susquehanna	5,100	24	..	..	54
Philadelphia & Reading	800	50	..	..	8
Philada., Wilmington & Balt.	3,100	60	..	12	40
Pennsylvania	19,244	60	137	24	190
Pittsb'g, Ft. Wayne & Chicago	600	36	..	..	6
Toledo, Wabash & Western	500	24	..	..	5
Cincinnati, Ham. & Dayton	400	12	..	..	4
Michigan Central	298	33	..	..	3
Michigan Southern	200	14	..	..	2
Chicago & North-west	1,000	65	..	..	19
Chicago, Burlington & Quincy	300	26	..	..	3
Chicago, Rock Island & Pacific	1,600	48		..	18
Chicago & Alton	800	49	..	..	8
	54,421		3,332	..	592

This table is, of course, not perfectly accurate, since the returns from different roads are quite imperfect. But we think the Commissioners must have considerably overstated the case, in assuming, on the authority of "a writer in the New York *Tribune*," that there were 100,000 tons of steel rails in use in this country on the first of January, 1870, and 10,000 tons of steel-headed rails besides. The consumption is, however, increasing at an enormous rate, and the aggregate may now very easily exceed these figures.

The Commissioners draw from the reports received the following conclusions:

I. That extremes of temperature do not injuriously affect the steel rails. The Grand Trunk railway reports them as not injured by a temperature of 30 degrees below zero of Fahrenheit, and no other road appears to find them unable to stand a cold winter.

II. That the durability of steel rails far exceeds that of the best iron rails. No steel rail has yet been reported as having been worn out. The Providence road reports steel rails as having outworn thirteen iron ones, and apparently good for as many more. The Erie railway report their steel rails as having outworn thirteen sets of iron rails, and showing scarcely any signs of wear. The Philadelphia, Wilmington and Baltimore road report them as having outworn seventeen iron rails, and showing little wear. The Chicago and North-western say that steel rails have outworn fifteen iron rails, and show no perceptible wear.

III. That heavy grades and sharp curves do not materially affect the wear of the rails.

IV. That the rails should be carefully inspected before laying, and that usually all flaws and imperfections can then be discovered, and subsequent breakage in the track prevented. The present great risk to life and property from this cause may be almost absolutely obviated by the application to rails of proper tests and a small additional expenditure of money.

V. That square notches punched in the base of the rail are very objectionable, appearing to start a seam of fracture. Opinions are not agreed in regard to punching the stem of the rail, but the majority approve of drilling instead of punching. A suspended joint, requiring no holes in the rail of any kind, appears to be on the whole most suitable for steel rails.

As to steel-headed rails, they have not yet had so long a trial as the all-steel rails; and among the first that were made, instances of imperfect weld between the iron and steel were not uncommon. Some such cases were observed by the Commissioners during their visits of inspection. Of late, however, from careful observation of the results of their several trials, the manufacturers, both in this country and in Europe, have become able to furnish steel-headed rails which may be depended upon as having a perfect weld; and as this kind of rail can be afforded at a less price than the all-steel, probably the use of them will rapidly increase. Of 21,786 steel-headed rails made at Trenton, and laid on the Erie road, only 107 proved defective. There is also a steel-capped rail made by BOOTH, not depending at all upon the weld of the steel and iron, but upon the mechanical grip of the steel top upon the iron, the trials of which upon several roads have thus far given good satisfaction.

Besides their greater durability, steel rails have also the advantage of greater strength and stiffness for the same amount of material; the comparative strength of similar sections of steel and iron rails being as 5 to 3, and the comparative stiffness as 4 to 3. Since the first introduction of railroads in this country, the weight of engines has been doubled on the average, and sometimes increased even more. But, as a general rule, the weight of the rails has not been doubled, and when this has been done, a corresponding advantage has not been gained in stiffness and durability. Steel rails, therefore, are just what was needed to meet the requirements of heavier engines and heavier traffic.

With steel rails costing fifty per cent. more than iron rails, if the iron will not last more than five years, it is more economical to use steel. Recking iron rails at $80 per ton, that it cost to exchange the old ones for new $40 per ton every fifth year, and $3 per ton for expense of relaying, and allowing seven per cent. compound interest, the ton of iron rails at the end of the tenth year, including the two renewals, will stand at $258; the ton of steel rails, at $120 per ton, also at compound interest at seven per cent., will stand at the end of the tenth year at $247,88; is then stronger than the new iron rail just laid down, and likely to outlast fifteen or twenty more of them.

The conditions of the problem, however, are so constantly varying, that it is not advisable to attempt to lay down any precise rule on this subject. Each road, when time for renewal of its rails arrives, must take into consideration the amount of tonnage passing over its road, with the rate of speed, also the probable increase of service during a certain number of years, in order to ascertain the probable life of good iron rails. The difference of price between iron and steel must then be considered, and compound interest upon it computed for the period during which the iron would probably last. The rates of interest ruling in different sections of the country, and the credit of each particular road, thus become controlling elements in the problem, and render it impossible to formulate any rules.

The Commissioners have not received any reports from English railways; nor, in fact, has it been necessary to send for them, as they had before them for examination the reports made to the London Institution of Civil Engineers by Mr. R. PRICE WILLIAMS, in 1866, on "The Maintenance and Renewal of Permanent Way," and by Mr. C. P. SANDBERG, in 1868, on "The Manufacture and Wear of Rails," with the discussions following the presentation of these papers in that association of able and experienced engineers, railway officers, and iron manufacturers. The results arrived at by the experience in England are very similar to those reached in this country. No steel rail has yet been reported as worn past further service; and among numerous instances of their great durability as compared with iron, the Commissioners will only quote one on the London and North-western railway, of a steel rail which had outworn twenty-three iron ones opposite to it, and was then taken up in consequence of an accident, not from fair wear and tear. At this time, about five-sixteenths of an inch of the top had been worn off.

It is common to speak of rails lasting so many years; but the same rail would last twice as long on one road or in one particular spot as it would in another. "The life of rails may be measured by the product of the weight and the speed." Experiments in England "indicate that 220,000,000 of tons may be carried over good iron rails at a speed of one mile per hour; and any railway company knowing the load which annually passes over their line, and the speed of the trains, may, by multiplying the one by the other and dividing 220,000,000 by this product, ascertain the life of iron rails in years"* on their road, or rather what it should be; and if it does not come up to this result in practice, it is an indication that the quality of the rails is poor. On the Lancashire and Yorkshire, 62,399 trains, with a gross tonnage of 12,451,784 tons, wore out the rails (of best iron) in seven and one-fourth years. On the Great Northern, with a greater rate of speed, 65,529 trains, with a tonnage of 13,484,661 tons, wore out the rails in three years. At another point on the first-named road, on a level where all trains draw up, rails of the same character required 203,122 trains and 38,803,128 tons to wear them out in seven and one-fourth years. The steel rails mentioned in the last paragraph but one had carried 95,577,240 tons when taken up. The rate of speed at this point is not given, but assuming it to be the same as in the case of iron rails last mentioned, the steel rail has already carried two and a half times as much as the iron, and was not half worn out.

In regard to steel-headed rails, it was found in England, as in this country, that some of those first made proved defective from imperfect welding; but those of later manufacture have been entirely satisfactory. And in regard to comparative economy in the use of iron and steel, Mr. SANDBERG's estimate, reckoning interest at five per cent., is that "where ordinary iron rails are worn out in five years or less, solid steel rails are most economical; and where they last over ten and up to fifteen years, steel-headed rails would be the cheapest; but if the iron rails will last from fifteen to twenty years, or more, it is cheaper to use them."†

A form of rail has been suggested by several parties, which the Commissioners think likely to prove very satisfactory, both as to expense, durability, and ease to keep in line and surface, viz.: a compound rail of two sides ⌋ ⌊ with a steel top ⌈ resting upon them, all three parts bolted together, but breaking joints. Some such rails have been laid on the Charing Cross line in London, but no report has yet been received as to their wear.

The Commissioners desire also to acknowledge their indebtedness to the able report of ABRAM S. HEWITT, Esq., United States Commissioner to the Paris Exposition of 1867, on "The Production of Iron and Steel in its economic and social relations."

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* SANDBERG on Manufacture and Wear of Rails. Pages 8 and 9.
† SANDBERG on Manufacture and Wear of Rails. Page 13.

The Distribution and Extent of the Coal Fields of British America.

A LETTER FROM MR. JOHN CAMPBELL, OF NOVA SCOTIA, TO THE MINING JOURNAL.

GREAT BRITAIN owns over 2,500,000 square miles of land on the North American continent: 425,000 square miles of which constitute the Dominion of Canada—being less than one-fifth of the whole, and not more than one-fourth of even that can be regarded as occupied land—leaving 2,400,000 square miles still unoccupied.

The total area of Great Britain and Ireland is a little less than 23,000 square miles, with a population of about 400 persons to the square mile, while in British America we scarcely number three persons to the square mile, including the Indians. But the country is capable of sustaining at least 200 persons to the square mile—equal to a population for the whole of 450,000,000—and its natural resources are capable of sustaining this number during an indefinite period of time.

To Great Britain coal is regarded as one of the most essential elements of prosperity and power, because a very large proportion of her population is engaged in commercial and manufacturing pursuits whose existence depends on coal. Although her soil is capable of sustaining a comparatively large and prosperous population, and though its fertility is capable of endless renewal, yet she cannot retain her status in the world as a first-class power for a much longer period of time than her supply of coal lasts. At the present rapidly increasing rate of consumption her own supply within the British Isles cannot last much over 250 or 300 years—a very small point in the life of a nation.

It is quite clear, therefore, that the time must soon come when she will be dependent for her very existence, as a first-class power, on her great possessions on the North American continent. The quantity of coal yet known in all other parts of the world is so limited in extent as to be utterly insufficient to supply the greatly increased demand at that distant period of time. With the exception of British America, the United States is the only country in the world that can be said to possess within its own territory an inexhaustible supply of coal. But it would never do for Great Britain to depend on another nation for her supply of an element essential to her existence as a first-class power. British statesmen should, therefore, see that ample provision is now made to secure an inexhaustible supply of coal to meet the future wants of the nation. To secure this very desirable end, British America must be regarded as of vital importance to the empire, with which it should be firmly incorporated by some means as soon as possible. Every necessary sacrifice should be made to secure accomplishment of this object while it is possible, for the future prosperity and greatness of the empire depends on it to a larger extent than is generally supposed. The extent of land underlaid by coal in the British Isles is supposed to be about 12,000 square miles. A large extent of that area has already been worked out where the coal were most accessible, so that it may be regarded as quite certain that the price of coal must advance greatly, even during the next 50 years, on account of increased cost of mining. The coal consumers of Great Britain will thus be taught by degrees to look to America for their supply of coal; but should America, in the meantime, all pass under the control of foreign nations, Great Britain will have lost some of the finest coal fields in the world, over 20,000 square miles in extent of which are lying in the neighborhood of good harbors, both on the Atlantic and Pacific coasts, where her ships can reach it at all seasons of the year. This could not fail to prove a tremendous loss to a nation like Great Britain, depending so much for defence on her steam navy.

The United States have control already over no less than 600,000 square miles of coal; enough to last as long, in all probability, as steam-power will be required for national defence, or as a means of securing national supremacy. The coal fields of British North America, surpass, in extent and value, those of all other countries in the world put together, and contain a quantity of coal sufficient to supply the wants of the nation and secure its supremacy down to the latest periods of time. Should British statesmen, however, be now so short-sighted and blind to the true interest of the empire as to allow those vast areas of coal land to pass beyond their control, they will have committed a great mistake, and blasted the future prospects of the empire beyond remedy.

Perhaps a fearful mistake has already been committed in this matter when the Dominion of Canada was established, for it will, in all probability, ask for its independence in a few years, and may ultimately prove as selfish as any other foreign power, and give cause for regret that the country was not then made an integral part of the empire, so that the nation might have ample room for indefinite expansion within its own territories. The old British oak would thus be enabled to extend some of its roots deeply and firmly into a soil in which the Creator stored an inexhaustible supply of elements necessary for sustaining the vigor of perpetual youth. The short-sighted policy of lopping off the branches and planting them in the very soil into which the roots of the old tree should have been extended, must ultimately lead to its decay as an old sapless stump, surrounded by a selfish and ungrateful offspring. This suicidal policy should be at once abandoned, and the power of the empire should be firmly established on this continent by absolute incorporation by the transfer of the redundant home population, and the employment of sufficient capital to assist in the speedy development of its vast resources.

The most vital interests of the nation demand an immediate investigation of the whole subject, particularly the future relations of the empire and its North American provinces. It is also very desirable that the vast unoccupied regions in the interior of the continent should be carefully explored. Regarding the great extent of the region, where the soil and climate are of a very favorable character, much has already been made known, but much more is yet required before emigration on a large scale can be induced to enter the country.

Regarding the mineral wealth of the interior regions very little is known beyond what private adventure has brought to light, and a few important facts made known by scientific men attached to the various expeditions sent from time to time to the Arctic Sea, and across the Rocky Mountains within British territory. But even in these scanty materials, when carefully examined in connection with many facts brought to light by recent geological explorations in the Western States, we find sufficient evidence to warrant the conclusion that the country abounds in mineral wealth of every description to an extraordinary degree.

It has been well known for a long time that skirting the eastern base of the Rocky Mountains, from Mexico to the shores of the Arctic Ocean, for a distance over 2500 miles, the country is occupied by permian, cretaceous, and tertiary deposits, containing valuable beds of brown coal or lignite.

The average breadth of the trough occupied by the permian, cretaceous, and tertiary groups of strata is supposed to be about 500 miles, covering an area of 1,250,000 square miles; 900,000 square miles of this lie north of the 49th degree of north latitude, or in British territory.

Having carefully examined all the facts brought to light in connection with the subject, I find abundant evidence to prove, beyond all doubt, that true coal measures of the carboniferous group underlie the newer deposits over the whole of this vast area. Within the United States their outcrops have been discovered at various points on each side of the trough, and they are found to contain valuable beds of true bituminous coal of excellent quality, and of workable thickness, ranging from 2 to 6 feet. Those found on the eastern edge of the trough dip at an angle of 4 or 5 feet to the mile; while those exposed on the western edge are found dipping at a steep angle in the opposite direction, or eastward, after passing nearly 700 miles beneath permian, cretaceous, and tertiary strata.

At the 49th parallel, or boundary line, this great coal field cannot be much short of 600 miles in breadth from east to west. This would give over 450,000 square miles in that portion of it lying between the 49th and 59th parallels of north latitude, where those vast plains occur that are so well adapted for agricultural purposes. Between the 69th parallel and the North Sea there cannot be much less than 500,000 square miles that are underlaid by true coal measures, making in all the enormous area of 950,000 square miles of land underlaid by coal in one unbroken field.

This vast coal field is bounded on its western edge by the most easterly range of the Rocky Mountains; and it is probable that several detached basins of coal exist between the mountain ranges, in some of which anthracite will probably be found. Eastwardly it is bounded by a belt of metamorphic rocks, that extends from the Arctic Sea to the north shore of Lake Superior, on a course nearly parallel with the Rocky Mountains, for a distance of 1800 miles. The average breadth of this belt is about 200 miles; it is not much elevated above the country east and west of it occupied by the newer formations. It is known to contain rich deposits of iron ore, and will probably be found to contain gold also, for the rocks are of the same age as the gold-bearing rocks of Nova Scotia.

From the west end of Lake Athabasca, or about latitude 59 degrees north, and longitude 112 degrees west, to the 49th parallel, between 97 and 98 degrees west longitude, a point near Pembina, the belt occupied by the outcrops of the true coal measures may be traced for a distance of 900 miles. It passes a short distance west of Buffalo Lake, La Crosse Lake, Pine Island Lake, and close to the west shore of Winipegosis Lake and Manitoulen Lake, and thence nearly through the middle of the States Minnesota and Iowa to Boonsville on the Missouri river, where the strata of the groups are well exposed in its banks.

It is impossible now to appreciate fully the value of this vast store of mineral fuel, placed by the Creator beneath those fertile, but almost treeless, plains that form so large a portion of the interior of this great continent. It was evidently designed that the nations possessing it should be prosperous, powerful, and durable; for in no other part of the world has provision been made for such a purpose on so vast a scale. And we may rest assured that it was not made here in vain—no! not even that portion of it lying within the Arctic regions.

Now is the proper time for securing to the British empire the incalculable advantages that must result in the future from the possession of this vast store of an element so essential to national prosperity and greatness. Let its possession, therefore, be made secure now, and many centuries will not pass until the very centre of British imperial power is found established firmly on her own portion of the American continent. From this central position, with inexhaustible supplies at her command, she can continue to hold the highest place among the nations down to the close of time—should the vast resources of the country be developed, and no other causes operate to bring about the decline of her prosperity and power.

The firm establishment of British imperial power on this continent cannot fail to result in great good also to the powerful nation that now occupies the southern portion of it. The friendly rivalry that would be thus ensured between the two great sections of the same family, as to who should best work and best agree, would secure mutual and permanent benefits of incalculable value to themselves and to the whole world. A friendly struggle for supremacy between the two great Christian and highly civilized nations, having the natural advantages about equal on both sides, would be conservative in its effects on their laws and institutions, and would greatly tend to remove much that is evil and corrupt in their rival systems of civil government. Mutual understanding and good-will would thus be promoted, and the two nations would make such rapid progress, and would attain to such great power and influence in the world as to enable them to put an end forever to national wars, and render great standing armies unnecessary in civilized countries.

On the Manufacture of Vitriols.

BY A. EILERS, MINING ENGINEER.

IV.

OF the sulphurets of copper occurring in nature, chalcocite, ($Cu_2 S$) covellite, ($Cu S$) and chalcopyrite ($Cu_2 S + Fe_2 S_3$) are the best suited for the manufacture of blue vitriol. Out of the two former the copper can be extracted in the form of vitriol, in the cheapest and completest manner, by roasting in reverberatory furnaces and subsequent leaching with hot water, strongly acidulated with sulphuric acid. A portion of the copper already converted into a sulphate of copper by the carefully conducted roasting process, will in this way be extracted immediately by the water, while the portion which has become oxide of copper by roasting, forms sulphate of copper with the sulphuric acid, and passes into aqueous solution. The small amount of iron which is nearly always present in the above two minerals, though it is sometimes not in their crystallized varieties, will not pass into solution, as oxide of iron becomes, after exposure to red-heat, insoluble in sulphuric acid; and a very pure vitriol can thus be secured.

To produce sulphate of copper, however, by the roasting process alone, without any addition of sulphuric acid in subsequent operations, chalcopyrite is the most desirable mineral. In this process the copper pyrites is first pulverized and, without previous separation from the gangue, (such as is almost always necessary for smelting operations) it can be directly introduced into the roasting furnaces. This is one reason why copper ores too poor to be treated for metallic copper, (in which case the expense of the necessary mechanical concentration before smelting is often fatal to profitable operations) may be in many cases used to advantage for the manufacture of vitriol.

The furnaces employed are always reverberatories, either open-hearth or muffle furnaces. They are generally very long and comparatively narrow; or two or more are placed one above the other, and so constructed that the flame and heat pass successively from the lowest to the highest before the waste-gases enter the flues leading to the acid chambers or to the chimney. The charge can at intervals be lowered from the upper furnace into the one below, a new charge being introduced into the highest hearth, and thus a continuous roasting secured. In the flues are dampers for the regulation of the temperature, which must be as much as possible in the power of the workmen. The object of the above management of the roasting furnaces is, on one hand, economy of heat, and on the other hand, a gradual preparation of the ore and its prolonged contact with the developed sulphurous acid gas. The heat necessary for the process is very low, and little fuel, except for the first heating of the furnace, is required. In fact the burning sulphur supplies even more than is desired during the roasting; so that the dampers must be partly closed, in order to retard the otherwise too rapid draught, and to keep the sulphurous acid in contact with the ore as long as possible. By stirring the ore, either by hand or by machinery, new surfaces are exposed from time to time, and in order to make these as large as possible, the ore is thrown up in ridges across the furnace. The whole process is based on the well known relations of the temperatures at which sulphates of iron and copper are formed and decomposed. It is not necessary to enter here into a detailed statement of the theory of this beautiful metallurgical process, which has been so ably expounded by PLATTNER, KERL and others; suffice it to say that all explanations agree as to the final results established in practice. The sulphate of iron is formed long before even a cherry-red heat is reached in the furnace; at this temperature the sulphate of iron is decomposed, the sulphurous acid developed from the iron salt aiding materially to produce, in conjunction with that from the oxidation of the disulphide of copper, the sulphate of copper, while the iron remains as an oxide. If the heat be carried higher, the sulphate of copper will also be decomposed; and it requires therefore much attention, and the frequent taking of samples to maintain the correct degree of heat. The formation of sulphate of iron takes place when the double reverberatory is used in the upper furnace. In the muffle furnace (which is charged at the flue-end, and the charge gradually moved towards the fire-bridge) sulphate of iron is found at about the middle. In the lower furnace, (when two are used) or in the part of the muffle nearest to the fire-bridge, the copperas is decomposed and the sulphate of copper formed.

The temperature in the furnaces has been correct, and the ore nearest to the fire bridge must be drawn out, when a sample is taken, and after cooling a little, brought in contact with water, gives an abundant deep blue solution, without greenish tinge. The sample is taken by withdrawing from the furnace, opposite the working door nearest to the fire-bridge, and about half way across, a portion of the ore with a small test-shovel, or large spatula. It is then put, in the form of a ridge or dam, across a porcelain saucer, care being taken that on at least one side of this ridge, no ore is scattered. At the opposite side, after the sample has partially cooled, water is added in very small quantity. This first water is absorbed by the anhydrous sulphate of copper; but if a little more is added on the same side, a clear blue concentrated solution of copper-vitriol will at once appear on the other side of the ridge. This solution is then diluted by an additional supply of water, in order to permit of better judgment in regard to the color, and of an easier discovery of a greenish tinge, which would announce the presence of iron-vitriol in small quantity. A dark green color of the solution shows the presence of much copperas; while a dirty, pale green assures us that no appreciable quantity of blue

vitriol has yet been formed. In both cases, the roasting must be continued until the sample presents the desired characteristics. If the heat has been carried too high near the fire-bridge, the solution obtained from the sample presents a light blue color already with the first addition of water, and the presence of much oxide of copper is thus revealed to us. This should never occur; and cannot, if samples are taken at the proper intervals, of five to ten minutes, towards the latter part of the process. But if this undesirable result has been reached, the oxide of copper can only be transformed into vitriol by direct leaching with hot, diluted sulphuric acid, or by smelting the charge together with unroasted copper pyrites into matte, which must then be pulverized and pass through a more careful roasting process. If a satisfactory result has been reached in the roasting process, the hot ore is drawn out into iron cars, and dumped into lead-lined leaching vessels. These have double bottoms (over the upper, perforated one of which coarse cloth is spread), and are half filled with water. Here the ore remains for twelve hours, being occasionally stirred, and at the expiration of that time the blue solution is drawn off by means of wooden faucets at the bottom. It undergoes then the usual operations of settling, concentration (if necessary), and crystallization, as described in a former article. The crystals obtained after the first concentration are very pure vitriol; a product mixed to a small degree with sulphate of iron is obtained by concentrating the mother-liquor, and crystallizing again; and out of the second mother-liquor the copper must be precipitated by iron, as another crystallization would produce vitriol too impure for the market. The cement copper is either dissolved in sulphuric acid and manufactured into vitriol, or sold in metallic form. Where smelting works are connected with the establishment, the cement-copper is added in the black copper smelting.

For the process above described, only such pyrites as contain only sulphurets of iron and copper should be employed, since these give, without troublesome and expensive purifications, the best product. Copper vitriol is, however, often made from artificially prepared sulphurets of copper: and in this case the original impurities of the ore, being incidentally removed in the preparatory treatment, exert no injurious influence. Of the processes introduced for this manufacture, two are especially prominent. In one of these, the artificial sulphuret is produced by heating old copper (sheet-copper, scraps, etc.) in a reverberatory, and afterwards adding sulphur while the draught is cut off. In the other, the sulphuret is produced in the regular course of copper-smelting in the shape of matte. In the latter case the highest grade mattes are the most suitable, as they contain the least iron.

To convert old copper into sulphuret, it is, as we have said, heated in reverberatories, and, when red hot, about one sixth of its weight of coarsely pulverized sulphur is added, while the flues are shut. The disulphide of copper formed on the surface of the copper-sheets is taken out; and the remaining copper is again treated as before. The resulting disulphide is pulverized and roasted in the same furnace. Much sulphate is formed; but owing to the absence of sulphate of iron, or some other sulphate which is decomposed at a lower temperature than sulphate of copper, much oxide of copper is also formed. It is, therefore, necessary to leach the product of the roasting with dilute sulphuric acid, in order to extract all the copper. The solution undergoes subsequently the operations of settling, etc., and a very pure blue vitriol is the result. In order to make sulphate of copper from furnace products, the highest grade matte from the last smeltings are generally selected, because they contain the least foreign substances. They must be very finely pulverized before roasting, and the product must also be leached with dilute sulphuric acid in order to dissolve the oxide of copper which, besides the sulphate, is formed in large quantity. The final product is pure vitriol, especially from the two first crystallizing operations. The last mother-liquor is treated by the manipulations we have described in connection with the manufacture of vitriol from copper pyrites.

In the regular course of operations, copper vitriol is produced in many establishments as a by-product, in various other ways than those above mentioned; but none of these are suitable, where vitriol manufacture is the main object of the works; and we shall therefore omit them here.

At present, sulphate of copper commands a very high price in the market compared with the value of the raw material, and it is now, in most localities in this country, more profitable to make blue vitriol from the ore, or even from matte, than to sell the ingot-copper. Only excessive charges for transportation may alter this fact, since the bulk of the vitriol is four times as great as that of the ingots; but where freights are at all reasonable (indeed, if the transportation to market does not exceed 1½ cents per pound) this manufacture can scarcely fail to be extremely profitable.

More Pumps for the Lookout Mountain Water-Works.

THE Woodward Steam Pump Company, No. 76 Centre street, in this city, have just shipped to the Lookout water-works, Chattanooga, seven tons of their celebrated duplex steam-pumps, of a capacity of 1,500 gallons per minute. This is the second order for these pumps for this locality, the first pumps ordered having given entire satisfaction in every respect. It may be well to state here, that the peculiarity of the Woodward pump is such that it is "always ready" in any emergency, which makes it particularly adapted to these water-works, as oftentimes a sudden rise of the river will cause the pump to be submerged to the depth of thirty feet or more; and they do duty as well under water as in the open air. The work-shops of the company are busily running out pumps of every size, to fill orders that are coming in from every section of the country.

Iron and Steel Welder and Iron and Steel Manufacturer.

WONDERFUL as have been many of the discoveries which characterize the present practical era of the world, the process recently developed by J. F. BEAZELL, Esq., of Uniontown, Pa., possessing the power of eliminating sulphur and phosphorus from impure or ordinary metals, and for welding all grades of steel, and iron and steel together, is still more startling. The efforts of both scientists and practical workmen have for many years been ineffectually directed toward the attainment of a method of producing homogeneous iron. Still such a material is practically unknown to iron workers; that is, iron without laminæ, but not necessarily without fibre. That the want of such a material has long been the great desideratum of the age there can be no doubt; while any method to accomplish the object, it is equally certain, has hitherto been unattainable. The whole history of the wear and tear of iron in all its uses but confirms these statements. Our rails do not wear out, but go to pieces, simply because they are not homogeneous. Our Monitor plates yield to the impact of shot from lack of homogeneity, each plate being in fact but a series of plates imperfectly united. So universal is the lamination of iron, that an examination of the product of the world would fail to discover homogeneous wrought-iron in mass. The causes of this condition may be sought in the impurities of the metal, as in the case of the two elements which most impair its tenacity—sulphur and phosphorus, the elimination of both of which has been heretofore the great problem for solution. Fortunately the future is full of promise, for a simple and inexpensive method of overcoming all these obstacles and giving us a purely homegenous iron, has but recently been brought to light, the importance of which to the iron and steel interest cannot be over-estimated—can hardly be imagined.

Experiments have been made for months past with this process, in the presence and under the supervision of experienced and scientific iron men, at some of the largest furnaces and machine shops in the United States, and in every instance it has shown the remarkable qualities claimed for it.

It has the wonderful property of so thoroughly and firmly uniting, mingling and massing iron and steel together, that it is a manifest impossibility to separate them, even when subjected to the severest test. As proof of this, an iron rail was steel-capped by this process, then reversed, placed under a five-ton steam-hammer, with a capacity of a blow of one hundred tons and a fall of over thirty feet. The application of this force failed to make the least impression upon the weld, while the steel above and the iron below it were completely torn and shattered. This test may be fairly regarded as affording the maximum amount of strength, rigidity and durability that the requirements of locomotive traffic, in the conflict perpetually existing between wheel and rail, can possibly demand. It entirely changes the whole question of rails to qualifications of lightness, strength and durability, instead of, as heretofore, one of mere weight.

Another remarkable, valuable, and thus far unaccountable influence possessed by this wonderful flux, is that of preventing the destruction of all grades and qualities of steel by burning, even if placed above a white heat; for if destroyed by this medium, it can be completely restored to its former strength and purity by simply applying the agent to the metal once or twice while being heated. Steel condemned as worthless, and burned until it crumbles beneath its own weight, has been restored, tempered, and a planing tool made out of it, so that it was used in planing a cast-iron driving box. A piece of cast spring-steel thoroughly burned was restored, worked into a knife-blade, and ground to a razor-edge without turning. It has been impossible to destroy steel by burning, while under the influence of this process, although subjected to the most intense heat for hours at a time; but, on the contrary, it greatly refines, improves, and toughens it.

It has the quality, by simple mixture and manipulation, of turning old scraps of Bessemer steel into good solid rails, directly from the rolls, heretofore impossible, as there is no process known except the present one which has ever accomplished this fact. In the manufacture of iron from red or cold short ores, in the puddling furnace, it has likewise attained equal success, imparting great strength and ductility to the iron, and simplifying and cheapening the production of metal directly from the crude ore. These results are not deduced from theory, but are facts vouched for by that teacher, "to-day's experience," and such is the confidence in the exactness of these conclusions, and the ability of the process to realize them in practice, that many sales have already been effected, and munificent offers are being made daily to the inventor for rights to use this great discovery.

It can be applied to a multitude of operations, which absolutely could not be performed without it. The tests already made have demonstrated the following capabilities of the preparation:

1. Iron of an excellent grade, both as to ductility and strength, can be produced from red and cold short ores, the agent uniting by chemical action with the sulphur and phosphorus of the iron, which passes off in the form of gases, leaving the iron free from injurious ingredients.

2. Steel-capped rails, which cannot be separated by wear or tear, can be made directly under the rolls as easily as iron. The steel-cap worn off, the rails can be used again and again, each repetition of the process but serving to improve the iron base.

Equally universal as its use will be in its applicability for welding purposes, the fact is established that alternate layers of armor plates for iron and steel-clad vessels can be so constructed as to possess a resisting force impenetrable to the most powerful projectile.

4. Copper, heretofore only united by brazing, can be welded in all forms. Tests show that welding of copper can be effected by one heat, without the slightest injury to the metal, and as if beaten from a solid mass.

5. There is no calculating the great value of this new agent in the manufacture of both large and small wares of iron and steel, and all kinds of agricultural implements, tools, and cutlery, as it so refines and toughens the steel that it holds its edge almost indefinitely.

To the enterprise of the Pennsylvania Railroad Company (who have purchased the right to use this great welder), in making exhaustive and expensive experiments is in a great measure due the credit of bringing it before the public. Always cautious in dealing with new and untried articles, this company is, however, prompt to "prove all things and hold fast to that which is good."—*Pittsburg Review and Price Current.*

MINING SUMMARY.

Arizona.

The *Miner* of April 23d has the following report of mining affairs in Central Arizona: "It is highly gratifying to us to be able to state, with truth, that the good luck which, for some time past, has attended those engaged in working quartz in this vicinity still sticks to them. The ten-stamp mill of the Big Bug Mining Company, which is situated in the Big Bug mining district, about sixteen miles south-east of Prescott, has given us glittering proofs of the wealth that is contained in our hills, and the results there obtained have caused the miners of other districts to pitch in and conquer. Five or six months ago there was not one mill running in this section of Yavapai county, and mining matters looked exceedingly blue. Trials had been made to make our lodes pay by milling process, and in almost every instance those trials ended in failures, and the mills were shut down. But that confidence in the richness of our mines, which has kept most of us in the country, and caused us to risk life and property, never deserted our people, and that perseverance, which is one of the greatest traits in their character, spurred them on to make new trials. New men—who have proven themselves good miners and mill-men—came here, were engaged by our mill and mine owners, and have, by their works, proven that the faith of our people in the richness of the mines was well founded. The Big Bug Company started in on a new and untried lode, with a slender purse, and with no prospect whatever of receiving aid from 'capitalists.' Fully realizing their situation, knowing that another failure might prove disastrous to them, they paid the strictest attention to their affairs, practised economy, and made a success.

"The latest run, of which we have any knowledge, yielded a gold brick weighing just ten pounds. This amount was taken out in seven and one-half days. We are hourly expecting to hear of a much larger clean-up having been made. Messrs. L. C. Gray and C. E. Hitchcock, the owners of mill and mine, started for San Francisco on Saturday last. One, and perhaps both, of these gentlemen, will visit the east before returning here, to make arrangements which will enable them to carry on operations on a more extensive scale. We believe it is their purpose to have a forty-stamp mill put up to order at St. Louis, and shipped here, via Kansas Pacific Railroad, thirty-fifth parallel route. This mill will be erected close to the mine—so close that the ore can be run into it from the dump pile at a trifling expense. Then the cost of mining and milling the ores will not exceed five dollars per ton, and the profits of the company will be great. The old mill will not be removed from its present location, it being in the right place for working ores from the Galena, Dividend, Independence, and other well known rich ledges. The future of Big Bug district is indeed bright. We hope, within two years, to see at least five mills on the creek, and over one thousand people in the district. The Eureka ten-stamp mill, in Walker district, is now engaged testing matters there, and, we believe, with good success. A clean-up will soon be made, when we will give the result to our readers. At present all we are at liberty to say, and all we care to say, is that matters look exceedingly hopeful.

"We visited the Sterling mill on Wednesday last, but did not stay long enough to take a good look at it or the ore. The mill was not running, but steam was up, and Superintendent Beseler informed us that he would start the mill that afternoon. We are sorry to say that the test recently made by him has not given entire satisfaction. He has now several tons of sulphurets on hand, and is preparing to work them. He will visit San Francisco soon, and make a report to the company. Work will, in all probability, be suspended for a short time. We had intended to devote some of our space in giving an account of the way matters have been conducted at the Sterling, but will defer doing so until some future time. We will now merely remark that it is the opinion of our best miners that the stockholders of the company are alone to blame for the poor success that has attended all efforts to work the ore successfully.

"We have the best of news from Wickenburg district. Messrs. Behan and Hamilton returned home on Tuesday last from a visit to Wickenburg and Vulture City. From them we learn that the deep shaft in the Vulture Mining Company's ground was down 250 feet—the ledge at that depth being twenty-seven feet thick, and very rich. The rumor that water had been struck at the bottom of said shaft was not true. The mill was running, and our informants say that Superintendent Sexton was well pleased with results.

"The owners of the White Picacho mine were jubilant. Their tunnel had reached the vein, which, upon cutting through it, was found to be about three feet thick. The ore is said to be very rich. The same parties inform us that work was being pushed on the recently discovered lodes in Martinez district.

"PROSPECTING

is still going on. Recently, in Walker district, a large and rich lode was discovered; and, in the Hassayampa district, Frank and Lew. Alters found, a day or two ago, a huge lode, containing much silver and gold.

"PLACER MINING.

"This industry is 'drying up,' owing to the dry state of creeks and gulches; yet about fifty men are still engaged in the business, on the Hassayampa, Lynx and other creeks. During the week several small lots of dust were brought to town by miners."

Virginia.

A writer in Lippincott's *Magazine* says: The gold mines of Virginia are being once more worked to advantage. A number of Philadelphians have bought land in the neighborhood of Fredericksburg, the Wilderness, Spottsylvania and Orange Court House, and it is estimated that capital to the amount of half a million of dollars, in the hands of companies and private individuals, has been invested in the business of digging and washing gold. Property in Fredericksburg and its vicinity is advancing in price, railroads are building in various parts of Virginia, and there is at least a certainty that

the unequalled resources of that Commonwealth will be developed. The mere business of collecting sumac and preparing it for a market is giving employment to many hands in Northwestern Virginia, the product in 1869 of ten mills alone having been twenty-eight hundred tons. These facts concern more than the inhabitants of the State immediately benefitted and their neighbors on the North, for as the industries of the South grow and multiply, the burden of national taxation will everywhere grow lighter.

California.

REVIEW OF THE GRASS VALLEY (NEVADA) MINES.

The Grass Valley *Union*, May 1, says: The month which ended yesterday has been remarkable for the industry which has been shown in this district in quartz mining. The mills have generally done well, and the opened mines have almost all realized profits to owners. Prospecting has been and is unusually active, and what is better many ventures of the kind more than pay their own way. It would astonish many of our older citizens, who stay in town all the time, to take a trip through the country immediately around us, and note the work which is being done. Such a trip would make the desponding brave again, and cause the man who wants to leave this favored locality, to pause, no matter what temptations the cow counties might offer. Our note-book shows some of the work which is being done here, and we transcribe from it the following items:

THE EUREKA MINE

is working away as usual, oftener going over $2,000 per day than falling short. The incline is down 750 feet, and is almost perpendicular. The Eureka mine is something like what Daniel Webster said of Massachusetts: "There she stands—the world knows her history by heart." The management of the Eureka have concluded that the ledge is well enough defined to sink for another level, and to make more extensive underground developments. Accordingly the shaft is now going down, and in a few weeks another level will be opened.

ALLISON RANCH MINE

is doing well. The miners are now down about 600 feet on the incline, which puts them 100 feet below the ground on which the old company worked. Sinking and opening drifts has been the object of the company, more than to keep the mill running. They are now preparing to sink for a new level. In the present drifts the ledge looks well both north and south of the shaft -the south drift showing excellent rock in large quantities, which was an agreeable surprise to the superintendent. There are 22 men working in each shift, under ground, making 44 men in the mine. The mill has been kept running most of the time, though, as we before remarked, this has not been made a special object. During the last week or two, the mill, with 12 stamps, has crushed about 22 tons of rock for each 24 hours. On Friday rock was being put through the batteries, which good judges say was worth $60 per ton, and we could readily believe it from the appearance of the plates covered with amalgam, and from prospects from blanket-washings. The mine is easily kept free of water by the sixteen-inch pump, working on a five foot stroke. Since this pump has been put down, no trouble has been experienced from water, though the mine is known as the wettest one in the district.

THE BRIGHT MINE,

located near the Colfax road, has a crushing of 43 tons of rock a Ben Macauley's mill. This rock is giving a yield of about $30 per ton. The ledge has been worked as far as possible without steam hoisting and pumping machinery, and Driscoll & Co., the owners, are negotiating for machinery. The ledge is large and full of metal at the water level, where the miners have to leave off.

THE NORAMBAGUA

ledge, at Forrest Springs, is being worked through a tunnel. This tunnel is run into the hill 1,100 feet, and it cuts the ledge at a depth of about 250 feet perpendicular. The mine is now being worked by eight or ten men, who have a lease of the property from Campbell & Stoddard, of Boston Ravine. A crushing of 100 tons of the rock is to be put through at Perrin's mill, in the course of three weeks. About half that amount of rock is now on the surface, at the mouth of the tunnel. If the crushing proves satisfactory in results, a mill, to run by water-power, will be erected at a convenient place near the mouth of the tunnel. We remark that the rock now out looks very well, having much the appearance of that which comes from the Perrin mine.

THE GEN. GRANT MINE

has a crushing at Perrin's mill, ready for the batteries. Next week it will be put through. The Grant is near Perrin's residence, and is the most southerly of the prospected ledges in the district. From ten to twelve men are employed on the ledge. The rock has paid as high as $80 per ton, and never less than $21 per ton. The workings do not go down more than 30 feet, but the ledge has every appearance of permanency, as it certainly has been rich.

PERRIN'S MINE,

in the south part of the district, is one of the best in the State, when we reckon profits. Perrin's mine was opened in 1856 or 1857, and has not at any time failed to give good returns. The hoisting, pumping and crushing are done by water-power, thus securing cheapness in such usually expensive operations. The miners are down 370 feet on the incline, which places them only 160 feet deep on a perpendicular. The ledge is very flat, having only five feet pitch in 130 feet. It is from 8 inches to 5 feet in thickness. In the stopes men can run wheelbarrows with all ease. Forty men are employed under ground, and these can easily keep the mill running all the time. The mine is owned by Joseph Perrin, A. B. Dibble (not our lawyer friend,) and Benjamin Colvin—Mr. Perrin owning one-half, and the other two a quarter each. Mr. Perrin owns the mill and the water-right in his own right. The mill has 10 stamps, and is capable of crushing 20 tons per day of rock from the Perrin mine, and about 15 tons per day of rock from the Grant mine. The mill is well arranged in all its details, and the large water-wheel put to its full capacity will run all the crushing and amalgamating machinery, and the saw-mill beside. Thus it is that water, pouring over a wheel day and night, is leaving money in the pockets of one of our best citizens. Last winter the Perrin mine was opened more thoroughly than it ever has been; and since the extension of the openings the mill has been running about a month. A clean-up of the plates below the batteries last week gave a return of $18 75 per ton, and the gold in the batteries will of course very largely increase the figures.

THE WILD OATS LEDGE

is a new discovery, just in the edge of Boston Ravine, near the old Auburn road. The ledge is a very small one, and is supposed to be a spur of the Rocky Bar ledge. There are three owners in this venture, and they are doing their own work. Kennedy & Co. struck the Wild Oats when sinking for water. A crushing from the ledge gave at Macauley's mill the return of about $18 per ton. This more than pays wages.

THE SHANGHAE LEDGE.

south-west from Rocky Bar, and very near to it, has given recently a yield of $55 per ton. This ledge is a small one, but very rich. It is probable, however, that the ledge can not be worked a great while longer unless Massachusetts Hill is pumped out. There are many other mines in the vicinity which we will duly mention hereafter.

Montana.

THE UNION LEAD AND OTHER MINES IN THE VICINITY.

In reply to a New York correspondent for further information on the Union lead, of which we published a short account some time ago, the *Capital Times* condenses the following account from a recent letter in the Helena *Herald*: "The hill, horizontally along whose sides lies the lead, slopes gently towards the South and West. The discovery claim is not yet so thoroughly developed as the other mines on the lead, owing to the fact of its having lain idle for a long time, while they were being vigorously worked. But it is supposed to be as rich as the other portions of the lead. The I. X. L. company's mine is sunk on to the depth of about four hundred feet, the lowest point reached by that company. The mine, with the conjoined mill located half a mile west, in Grizzly gulch, is under the supervision of J. C. Ricker, a gentleman distinguished throughout the Territory for his sterling business qualifications and irrepressible energy and industry. Here activity and bustle prevailed on every hand. Between the fourth and fifth levels we encountered a large force of men industriously at work in the various branches of the miner's craft. The workmen, as in other claims, were distributed about in pairs—one holding the drill and the other (his 'partner,' as each familiarly calls the other) driving it home with Cyclopean blows with his hammer. Holes of something more than an inch in diameter are thus driven into the solid quartz, varying in depth from one to three feet. These, when charged with powder, frequently break down many hundreds of pounds of rock at a blast. The quantity of rock taken from the mine, at the present time, amounts to about forty tons every twenty-four hours, while the crushing capacity of the mill is but from twenty-five to thirty tons. This preponderance of the quantity raised from the mine over that crushed by the mill manifested itself to the eye by a huge pile of first-class ore at the 'dump,' estimated by the foreman and other experienced miners at from sixteen to eighteen hundred tons, and which will be greatly augmented, no doubt, before the close of winter. From first to last the I. X. L. mine has been thoroughly and systematically worked. Every part of it bears the impress of masterly hands, directed by a clear head. The width of the vein where the miners were at work varies from two to five feet, the quartz being mostly of that white, crystallized variety which characterizes the lead throughout. Although Mr. Ricker may have amassed thousands of dollars already from the working of this mine, in the humble opinion of your correspondent, he has but just begun to realize the vast riches locked in these subterranean vaults—to which he may have ready access whenever he may choose to do so. Next comes the mine of the National Mining Company, then that of the Columbia Mining Company, in which work is being actively carried on. Opposite the I. X. L. mill, on Grizzly gulch, stands the new mill owned by Mr. Whitlatch. It was vigorously pounding away upon ore from the well known Park lead, which lies about half a mile west from the mill. Our time would not permit us to visit this mine, but we were informed that Mr. Whitlatch had a large number of men employed, and was pushing his work with characteristic energy."

CAVE IN THE HOW TUNNEL.

The *Capital Times* of Saturday, April 30, says: "On Wednesday evening a cave took place in the lead of the How tunnel on the 600-foot level. It is not known whether the levels are covered up or not, or only the face of the lead. We sincerely hope that it is the latter. Workmen are now engaged clearing away the debris, so that the result of the damage will be known in a day or two. The Superintendent of the lead has been fearful that a cave might take place, and had almost completed the work of getting out and preparing the timbers, but, unfortunately, before they were quite ready, the accident anticipated took place. As the cave occurred after the men had stopped work, no loss of life or limb has to be chronicled."

Colorado.

A HARTZ MOUNTAIN JIGGER.

Says the Central City *Register*, April 29: Mr. Keck, a gentleman from Freiberg, has erected what is called a Hartz Mountain Jigger—somewhat modified by him to suit the different circumstances occurring here—and is running it at the Consolidated Gregory Co.'s mill. Last year some comparative tests between this machine and a Cornish buddle, were made from the same lot of tailings. The jigged tailings were sold for $19 per ton; those buddled for between $10 and $11. The proportion of tailings saved in buddling averaged about 1 to 8. By jigging as high a proportion as 1 to 5 has been saved, while the average will probably be found as 1 in 6 to 8. The jigged tailings shown us were very clear and contained much more fine pyrites than buddled tailings. The sand was also very pure, while in the discharge from the machine, there appeared to be not more than 4 per cent. of pyrites. The machine is automatic, requires very little power, and costs but little in construction.

MISCELLANEOUS MINING ITEMS.

The following news items are also taken from the *Register*, April 27: William Church, Superintendent of the National Gold Mining company, has three men at work on the Extension West. They are now drifting west at a depth of 50 feet, but will soon clean out the shaft and sink it deeper, preparatory to running another level. No ore has been worked as yet, though some that looks finely has been raised. Hocking & Co. are working two different claims under lease. Their west claim has a shaft about 140 feet deep, and shows a crevice carrying 6 or 8 inches of pay. The ore is being sorted, and that tested under stamps averages about 7 ounces per cord. Their east claim has a 400 foot shaft. They are drifting and stoping from a depth of about 300 feet to the bottom. They report a pay vein of from 6 to 12 inches. Stamp ore from this claim yields about 5 ounces per cord, after the first quality ore has been selected for sale. The Ophir claims are being worked by Woodward & Co., and a party of Cornishmen, under tribute. They hoist ore about once a week. The water is left undisturbed, and the mine is gradually filling. Mr. McKibben is also taking out some surface ore, under tribute. Mines like trade, seem to have their periods of reaction. Such is now the case with the Burroughs lode; but we are informed, and are happy to believe that, ere long, this mine will be worked again, with all the energy of former years. The drifts on this mine, from the La Crosse tunnel, show well. We hope to give some interesting information about this enterprise hereafter. At the Keith mill, workmen are busy laying the foundation for a new 20-stamp mill, of the Pittsburg pattern. The stamps will weigh 500 lbs. and drop about 30 times per minute. When complete the tailings will be concentrated for sale, by running over pointed boxes. The stamps are intended to treat second-class material, while the Keith furnace and machinery will work on the first quality ore. The ore will be worked as formerly, *i. e.* pulverized, passed through the furnace, re-ground and amalgamated in dolly tubs.

British Columbia.

THE PEACE RIVER MINES.

A correspondent of the San Francisco *Bulletin*, writing from Victoria, April 13, says: Quite a large number of miners have left here lately for the Peace river mines in the Omineca country. The majority of them have taken the Skeena river route, but are at present unable to go further than Metlakatla, as the river is filled with ice, and thus impassable for canoes. The latest news from the new mines in Omineca, however, are anything but encouraging. My latest advices from the upper country, dated April 2d, state that those miners who are at present located upon Vital creek, which was discovered last summer and caused the present excitement, find nothing there, so far, sufficiently rich or extensive to induce miners to rush to it, or to cause any excitement whatever concerning it. Many believe that gold will eventually be found in paying quantities throughout the district, and that there is a likelihood of it turning out ultimately to be a good gold-mining camp, but any rush in that direction at present would be premature and would in all probability terminate in disaster. Providing the mines prove to be good and extensive, it will undoubtedly be soon enough to go there next season. It appears that the discoverers failed to secure their ground after all. The parties who were sent out to follow them to the diggings on their return thither from Quesnelmouth, succeeded in overtaking them and in arriving upon Vital creek before them, and immediately staked off all the ground on the creek, allowing the discoverers only 100 feet each. One hundred and fifty feet is allowed by law to discoverers; but, inasmuch as these men had dealt dishonestly towards the outfitters of the original expedition, and had foolishly neglected securing discovery claims before leaving the creek, due advantage was taken of their situation, and their ground limited to that quantity only to which a pre-emptor is entitled.

EXTENT OF THE MINES.

From the report of one of the parties sent in pursuit, Fred. Black, a gentleman on whose integrity the greatest confidence may be placed, it appears that Vital creek itself, so far as known, is very limited. One mile of the lower portion of the creek was prospected last summer by the discovery company, but gold in paying quantities could not be found, and on the upper part of the creek, about 4,000 above the discovery claim, they had been unable to find any gold whatever. It is supposed that one season's work will exhaust its bed, and providing that the benches on the lower end of it contain no pay, it will then necessarily be abandoned. The nine persons forming the two exploring parties of last summer, worked out about 700 running feet of ground, which paid to the discovery company (six men) about 37 ounces per man, and to the Chapman company (three men) 30 ounces each. The average yield of gold for the time occupied in working the ground amounted to about one ounce per man per day.

THE SILVER CREEK MINES.

On Silver creek, situated at a short distance from Vital creek, gold has been found for a distance of about three miles. The bed-rock is stated to be very shallow, and the flats very wide. The following is Mr. Black's advice to his personal friends: "I think it is very foolish for any one to come here without a summer's provisions and a determination to prospect and find diggings; for if any come here with the expectation of getting a claim that will pay at once, they will be sadly disappointed. It will be soon enough to come here when more is known about the country."

The general features of the Omineca favor the belief that it is a valuable and extensive gold-bearing country, but no just opinion can be formed of its worth or extent, as the amount of prospecting already done is too limited and indefinite.

The winter has been a very severe one, and the frost has proven very troublesome. The mercury at Lake Tatlah was frozen solid from the 10th until the 25th of January; consequently the progress made by prospecting parties has been very slow.

MATTERS AT CARRIBOO.

The news from Carriboo is uninteresting; only a few claims are at present paying, and consequently times are very dull. Lightning creek promises well for the coming summer; several companies have succeeded in bottoming its treacherous channel, and have found good pay.

Iowa.

DISCOVERY OF LEAD ORE IN MONMOUTH.

The Jackson (Township of Maquoketa) *Sentinel*, March 24, says: "A very important discovery of lead ore has been recently made in Monmouth township, a few miles west of this city, which bids fair to mark the beginning of a new era in the history of Maquoketa and Jackson county. It is a fact well known to most of our citizens that ever since its first settlement rich specimens of lead ore have been found throughout various portions of Jackson county, leading many persons to suppose that somewhere within its limits there might be found large deposits of the mineral. About three years ago a man by the name of Herrick, a citizen of De Witt, became impressed with the idea that lead ore was to be found in paying quantities in Monmouth township. Procuring the services of some experienced miners, they selected a spot near the flouring mill of Hon. L. W. Stuart, in Monmouth township, which the miners claimed bore every indication of being lead territory. Here they commenced operations, finding lead in small quantities as the work progressed, and inspiring the most sanguine hopes for ultimate success. Unfortunntely, however, Mr. Herrick's means becoming exhausted, he was reluctantly compelled to abandon the work. A short time since Mr. Stewart resumed work where Herrick left off, and last week his labors were rewarded by finding the metal in sufficient quantities to pay expenses, and the quantity gradually increasing as the miners penetrated further into the rock. Mr. Stewart forwarded us a specimen of the ore last Saturday, which contains 90 per cent. of pure lead. This discovery may be the dawning of an era of prosperity in Maquoketa which the most sanguine have never even dreamed of. What may she not aspire to as a great railroad centre, and mining and manufacturing town. Corner lots, forward!"

Nevada.

SAFFORD DISTRICT.

The citizens of Battle Mountain mining district, Nevada, have abolished the old name, and dubbed their district "Safford District," in honor of the Governor of Arizona, who is very popular in Eastern Nevada—his former home.

BUSINESS AND PERSONAL.

[*Short notices in this column fifty cents per line each insertion.*]

GLYNN'S ANTI-INCRUSTATOR FOR STEAM BOILERS.—THE only and reliable article for removing and preventing incrustation. No foaming, and does not attack metals of boiler. Liberal terms to agents. C. D. FREDRICKS, 587 Broadway, N. Y.
April 19 tf.

MARKET REVIEW.

The Coal Trade.

NEW YORK, May 26, 1870.

WHOLESALE.—The position of affairs in the market has not materially changed since our last writing. Trade is unmistakably very dull. Trinity Building is as quiet as its neighbor, the church. Everybody seems to be hanging around, Macawber like, "waiting for something to turn up." The Scranton sale was the all-absorbing topic of conversation during the first few days of the week, which, agreeable to our prediction, showed a marked decline. This will be a bitter pill for the "rambunctious miners" in the Schuylkill region, an advance in prices at this sale being the only chance for them in their present contest. Now we question if they will again be offered the $2 50 basis by the operators, and it serves them right if such is the case. We don't think any "corner" can be formed in coal to force the price up this summer, while every prospect is a further gradual decline. We hope the Schuylkill operators will withdraw their offer of a basis to the miners, as the Lehigh and Wyoming regions, sending the present heavy weekly shipments to market, will be able to supply all the coal required, and keep prices steady.

To say that the great decline at the Scranton sale was not anticipated, would be silly; there are, however, some alarmists in the trade who think the prices are too low, but we think differently. Retail dealers are not going to purchase this year until coal has reached the lowest notch. Many failures were caused last year by stocking up too early in the season. Consumers, also, have felt the burden of carrying coal purchased early in the year, at high prices, and they won't be caught napping either. We believe so long as the present supply to market is maintained, that no apprehension will be felt, and that all will be supplied in good time at fair prices.

The Pennsylvania Coal Company are bound to be the pioneers in low prices. We understand that their sales to contractors for June are some 20 cents per ton below those for May.

The supply of coal in this market is fully up to the demand. Lehigh coals of the larger sizes are perhaps a little scarce, or rather come in slowly.

Freight yet remains very low; vessels are in good supply.

At a meeting of the Lehigh Coal Exchange, held yesterday, it was resolved to maintain the prices of the past two months.

AUCTION SALE OF SCRANTON COAL—DECLINE IN PRICES.

Messrs. J. H. Draper & Co., sold 80,000 tons of Scranton coal at the company's rooms on Wednesday last. The following are the prices obtained, compared with those of May:

1870.			April 28.
10,000 Tons	Lump	$4 20	@ 4 32½
12,000 "	Steamboat	4 20	@ 4 25
16,000 "	Grate	4 40	@ 4 45
10,000 "	Egg	4 52½	@ 4 57½
20,000 "	Stove	5 25	@ 5 30
12,000 "	Chestnut	4 27	@ 4 32½
80,000			

Average price for April $4 62.

1870.			May 25.
10,000 Tons	Lump	$4 05	@ 4 22
12,000 "	Steamboat	4 10	@ 4 20
15,000 "	Grate	4 25	@ 4 37½
11,000 "	Egg	4 50	@ 4 52½
20,000 "	Stove	5 00	@ 5 10
10,000 "	Chestnut	4 29	@ 4 30
80,000			

Average price for May $4 51. Owing to strikes there was no auction sale between the months of April and August, 1869.

The Delaware Division Canal below Easton, which was badly damaged some four weeks since, has been repaired, and boats are now passed as usual.

The Shamokin *Herald* gives the following this week: "The late resumption was of short duration, and came suddenly to an end last week. It was hardly a seven days' wonder. The suspension in our county is now more complete than ever. The following collieries are standing idle: Bear Valley, Henry Clay, Buck Ridge, Hickory Swamp, Greenback, Henry Clay No. 2, Excelsior, Enterprise, Green Mountain, Stuartville, Reliance, Locust Summit (two collieries), Coal Mountain, Locust Gap (two collieries), and Ben Franklin, some 14 collieries in number. There is no prospect of resumption this month, and some experienced men here predict that there will be no general working until July. The shipments in our county (for time of suspension) continue to be large. It is estimated that over 500 cars are sent away daily at the present time, little over one-half of which is sent East."

Bituminous Coal Trade, 1869 and 1870.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending May 21, 1870, compared with week ending May 22, 1869.

COMPANIES.	1869. Week.	1869. Year.	1870. Week.	1870. Year.
B. & O. R. R.	21,915	325 607	19,758	293,988
C. & O. Canal	17,510	128,927	19,397	125,120
H. & B. T. R. R.				
Harrisburg & D.		16,802		229,774
L. V. R. R.		552		5,156
P. & N.Y. C. & R. Co.				

Harrisburgh and Dauphin Coal Trade.

The following is the amount of Bituminous Coal transported via the P. and R. R. for the week ending May 19, 1870:

	Tons.
For week	16,802 15
Previously this year	212,971 08
Total	299,774 03

Anthracite Coal Trade for 1869 and 1870.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending May 21, 1870, compared with week ending May 22, 1869.

COMPANIES.	1869. WEEK.	1869. TOTAL.	1870. WEEK.	1870. TOTAL.
*Phila. & Reading R.R.	859	1,174,045	28,535	834,928
Schuylkill Canal		181,640	2,084	27,657
Lehigh Valley R. R.	1 204	949,095	66,171	1,246,642
L. Coal & Nav. Co. R R.	1,804	300,570	22,335	374,679
Lehigh Canal	2,176	172,122	17,757	65,344
Scranton North	9,985	204,935	13,604	241,472	
" South	19,223	164,028	37,794	673,234
Penn. Coal Co., rail	25,065	318,679	24,349	408,644
" " " canal	116	3,435	239	3,214
Del. & Hud. Canal Co.	41,559	222,791	55,279	333,107
" " R. R.		97,577	6,009	205,989
" " south	64	41,650	15,062	141,597
Shamokin	2,139	136,719	9,874	116,613
Trevorton		7,054	3,372	28,235
Lykens Valley Coal Co.	515	18,547	4,835	17,627
Wyoming South	7,600	29,737	11,754	39,497
" North				
P. N. Y. C. & R. R. Co.			5,484	115,364
Williamstown, Col'y.	49	86,651	6,749	102,635
Total	112,253	4,601,279	331,589	5,464,928
1869			112,253	4,601,279
Increase week and year			219,336	463,649

* Less coal transported for Company's use and Bituminous coal.

Schuylkill Coal Trade.

Report of Coal transported via the P. and R. R. for the week ending May 19, 1870—less coal carried for Company's use, and Bituminous Coal:

For week	28,535 04
Previously this year	906,293 11
Total,	934,828 15
Same time last year,	1,174,045 00
Decrease,	239,206 05
Amount sent same week 1869.	959 00

Report of coal transported on the Philadelphia and Reading Railroad for the week ending Thursday, May 19, 1870:

From St. Clair	
" Port Carbon	2,095 11
" Pottsville	200 03
" Schuylkill Haven	13,217 03
" Auburn	1,271 01
" Port Clinton	8,661 07
" Allentown and Alburtis	3,039 15
" Harrisburgh and Dauphin	16,802 15
Total paying freight	45,337 19
Coal for Company's use	2,756 02
Total for week	48,094 01
To same time last year	1,176,141 12
Total	1,224,235 13
To same time last year	1,442,765 14

Report of coal transported over the Schuylkill Canal for the week ending Thursday, May 19, 1870.

	Tons. Cwt.
From Port Carbon	429 —
" Pottsville	166 —
" Schuylkill Haven	1,499 03
" Port Clinton	— —
Total for week	2,094 03
Previously this year	25,563 11
Total	27,657 14
To same time last year	181,640 02

Report of Coal Transported over Lehigh Valley Railroad

For the week ending May 21, 1870, and previously this season, compared with same time last year:

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	PREV'LY. Tons. Cwt.	TOTAL. Tons. Cwt.
Total Wyoming	14,186 04	270,117 19	284,304 03
" Hazleton	42,573 13	73,456 03	784,959 16
" Upper Lehigh	199 11	5,194 18	5,394 09
" Beaver Meadow	19,300 16	243,824 08	263,125 04
" Mahanoy	4,362 14	102,098 07	106,461 01
" Mauch Chunk		447 17	447 17
Total Anthracite	86,632 18	1,358,119 12	1,444,752 10
Bituminous Coal recv'd from Cats. R. R.	139 11	5,194 18	5,334 09
N. C. R. R.			
E. P. R. R.		5,156 00	5,156 00
P. & N.Y. C. & R.R. Co			
Fall Creek			
Schroeder			
Towanda			
Total by rail and canal	86,632 18	1,363,275 12	1,449,908 10
Same time last year	2,552 19	1,065,600 04	1,068,153 03
Increase	84,079 19	297,675 08	381,755 07
Decrease			
Forwarded East from M'h Chunk by rail	66,171 07	1,180,470 14	1,246,642 01
Same time last year	1,204 18	947,800 14	949,005 11
Increase	64,966 09	232,580 01	297,546 10
Decrease			

RECAPITULATION.

Forwarded East from M'h Chunk by rail	66,171 07	1,180,470 14	1,246,642 01
To N. C. R. R., at Mount Carmel		115 00	115 00
Forwarded North from L. & B. Junction	5,484 14	109,454 19	114,939 13
To L. & S. R. R. at Packerton for rail	216 15	3,445 19	3,662 14
Delivered at M'h Chunk	28 14	552 01	580 16
Delivered on line of road above Mauch Chunk	115 00	6,362 06	6 477 06
Delivered above M. Chunk for use of L. V. R.R.	1,060 05	23,326 11	24,386 16
To L. & S. R.R., at P'n Hav., for railroad	9,012 19	21,378 04	30,391 02
Do. for canal	4,543 03	13,013 18	17,557 03
Total Anthracite	86,632 18	1,358,119 12	1,444,752 10
Bituminous Coal		5,156 00	5,156 00
Total all kinds	86,632 18	1,363,275 12	1,449,908 10

Penn. and N. Y. Canal and Railroad Co.

REPORT of Coal Transported via the Pennsylvania and New York Canal and Railroad Company, for week ending May 21, 1870:

	WEEK.	PREVIOUSLY.	TOTAL.
Anthracite	5,484 14	109,879 17	115,364 11
Bituminous	6,201 00	78,019 00	84,220 00
Total, Ant. and Bit.	11,685 14	187,898 17	199,584 11

Report of Coal Transported by the Lehigh Coal and Nav. Co.'s Railroads and Canals,

Week ending May 21, 1870—Compared with same time last year.

WHERE SHIPPED FROM	WEEK, 1870. tons ct	WEEK, 1869. tons ct	YEAR, 1870, tons cwt.	YEAR, 1869. tons cwt.
Wyoming Region	28515 05	3686 14	394082 17	252890 17
Upper Lehigh Region	4175 05	43 00	40512 05	56577 19
Mahanoy Region				678 01
Hazleton Region	9265 05	181 11	33709 06	52309 14
Beaver Meadow Region	4543 05	98 17	16812 14	2509 00
Mauch Chunk Region		119 17	30089 18	118561 18
Totals	46519 01	4114 19	515217 00	504727 09
Increase				
Decrease	42404 02		10489 11	
DISTRIBUTION.				
Forwarded East of Mch Chunk by Rail	22337 15	1501 02	364679 01	300570 04
Forwarded East of Mch Chunk by Canal	17757 09	2176 02	65344 17	172125 16
Delivered at and above Mauch Chunk	831 02	134 15	14958 16	14471 15
Delivered to L. & B. R. R. at Plymouth Bridge	5592 15		73216 06	12459 11
L. V. R. R. at Sugar N.				5100 03
Totals	46519 01	4114 19	515217 00	504727 09
Of the above there was from Mines controlled by Co., W. B. C. & L. Co	12537 07	786 09	159484 04	122841 00
L. C. & N. Co		22 17	46743 15	115561 18
Totals	12537 07	809 06	206228 03	241402 18
Increase				
Decrease	11728 01		35174 15	

Shipments of Cumberland Coal

for the week ending Saturday, May 21, and for the year 1870:

SHIPPED BY	B. & O. R. R.	C. & O. CANAL.	TOTAL.
Cooke M.	.....	.....	.....
Borden	1,214 10	2,806 02	4,020 12
Consolidation	4,176 12	6,523 19	10,700 11
Spring Hill	394 09	.....	394 09
Midlothian	103 04	369 16	473 00
H. and B. Baltimore	93 11	67 02	1,617 13
do Va M	1,234 04	.....	1,234 04
National	.....	928 16	928 16
G. C. C. and I.	2,375 14	680 01	3,055 15
Maryland	3 510 07	7,385 14	10 896 11
American	1,655 13	4,306 11	5,962 04
Atlantic	487 10	.....	487 10
Piedmont	1,396 00	.....	1,396 00
Swanton	738 03	.....	738 03
Barton	1,164 00	.....	1,164 00
Potomac	1,827 00	.....	1,827 15
Franklin	2,453 10	.....	2,453 10
Big Vein	996 12	.....	996 12
Total week	23,821 09	23,068 01	46 889 10
Previous	351,784 16	129,107 17	480,892 13
Total year	375,606 05	152,175 18	527 782 03

Statement of coal transported over the Cumberland and Pennsylvania Railroad during the week ending Saturday, May 21st, and during the year 1870, compared with the corresponding period of 1869:

WEEK.

YEAR.	C. & O. CANAL. Tons.	C. & O. CANAL. Cwt.	B. & O. R. R. Tons.	B. & O. R. R. Cwt	TOTAL. Tons.	TOTAL. Cwt.
1870	19,397	15	19.758	01	39,155	16
1869	17,510	01	21 915	01	39.425	02
Increase	1,887	14				
Decrease			2,157	00	269	06

YEAR.

YEAR.	C. & O. CANAL.	B. & O. R. R.	TOTAL.
1870	125.120 00	293,988 05	419,108 02
1869	128,929 00	325 607 07	454,586 13
Increase			
Decrease	3,980 00	31,619 02	35,428 08

Prices of Coal by the Cargo,

[CORRECTED WEEKLY.]

	AT NEW YORK, May 21. R. A.	AT NEW YORK, May 21. W. A.	AT PHILADELPHIA, May 21. R. A.	AT PHILADELPHIA, May 21. W. A.
SCHUYLKILL.				
Lump	$— —	$5 00	4 50	— —
Steamer	— —	5 25	— —	— —
Broken	— —	— —	— —	4 50 to — —
Egg	5 75 to 6 25	5 50	— —	4 50 to — —
Stove	— to — —	6 00	— —	4 50 to — —
Chestnut	4 50 to 5 40	5 00	— —	4 00 to — —
Pea	— —	— —	— —	— —
LEHIGH.				
Lump, (along side)	6 00	— —	— —	— —
Broken	6 00	— —	— —	— —
Egg	6 00	— —	— —	— —
Stove	6 25	— —	— —	— —
Chestnut	5 50	— —	— —	— —
Pea	— —	— —	— —	— —
SPECIAL COALS.*				
Diamond Vein	R. A.	— —	— —	— —
New England	"	— —	— —	— —
Locust Dale	W. A.	— —	— —	— —
Honey Brook, Leh'h	W. A.	4 75 to 5 75	— —	— —
Spring Mountain	"	4 75 to 5 75	— —	— —
Sugar Creek	"	4 75 to 5 75	— —	— —
Sugar Loaf	"	4 75 to 5 75	— —	— —
Old Comp'y's.	"	4 75 to 5 75	— —	— —
Cross Creek	"	4 75 to 5 75	— —	— —
Enterprise	"	"	— —	— —
Girardville	"	"	— —	— —
McMichael	"	"	— —	— —
Shamokin	"	"	5 50	4 50 — —
Lykens Valley	"	"	— —	— —
Broad Top	"	"	5 50	— —
Hill & Harris	"	"	— —	4 50 — —
Henry Clay	"	"	— —	4 50 — —
Powelton	"	"	5 50	4 50 — —

Prices for Coal at Mauch Chunk.

	F.L.	Bro.	Gra.	Eg.	Sto.	Chs.
Lehigh	$3 50	$3 50	$3 50	$3 50	$4 00	$3 25
Wilkesbarre	3 50	3 50	3 50	4 50	4 00	3 25

For freight to Elizabethport and to New York see "Freights."

BITUMINOUS COALS.

Kittaning Coal Co.'s Phœnix Vein...f.o.b. at Phila.	$5 00
Lemon " " "	4 75
Cumberland Vein Coal	5 00
Cumberland C. & I. Co.'s on board N. Y.	7 00
Maryland Coal Co. "	7 00
Consolidated Coal Co.'s "	7 00

[*Dealers in these coals may be found in our advertising columns.]

Company Coals.

	L.	Str.	Gra.	Eg.	Sto.	Ches.
Scranton at E. Port	4 50	4 60	4 75	5 00	5 75	4 60
Pittston at Newburgh	4 50	4 80	4 90	5 00	5 45	4 70
Lackawana at Rondout	4 50	4 85	4 90	5 10	5 75	4 50
Wilk'b're at Hoboken	4 75	4 75	4 85	5 25	5 75	4 75
Old Co. Lehigh at Pt. Johnston	— —	— —	— —	— —	— —	— —
Lehigh at E. Port	5 50	5 25	5 25	5 25	5 75	4 75

For freights to different points, see "Freights."

Prices at Baltimore—May, 1870.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load	$5 30@5 50
Pittston and Plymouth, do	5 00@5 25
Shamokin Red or White Ash, do	5 50@6 00
Lykens Valley Red Ash, do	5 40@5 50
Zerba Valley	25 5@— —
By retail, all kinds per ton of 2240 lbs.	7 00@7 50
Georges Creek & Cumberland f. o. b. at Locust Point for cargoes	4 75@5 00
Fairmont and Clarksburg gas, f. o. b. at L. Point	5 35@6 50

Prices at Georget'n, D.C., & Alexandrin, Va.

May, 1870.

George's Creek and Cumberland f. o. b. for shipping..$4 55

Prices at Havre de Grace, Md.

Wilkesbarre and other White Ash for cargoes	$— —@— —
Lykens Valley	— —@— —
Shamokin Red or White Ash	— —@— —
Trevorton and Zerba Valley	— —@— —

Prices of Gas Coals.

May, 1870.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr. 73 Pine st., N.Y. Duty, $1 25, gold.

	Coarse.	Slack.
Block House	$1 75	@— 75
Gowrie	1 75	@— 75

Corrected by Bird, Perkins & Job, 86 South street.

	Coarse.	Culm of Coal.
Picton	$2 25	@1 25
Sydney	2 25	@— 80
Lingan	1 75	@— 80
Little Glace Bay	1 75	@1 00
Caledonia	1 60	@— 80

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty $1 25 per ton, gold, on the coarse coal. 25 per cent. ad valorem on the Culm of Coal.

AMERICAN.

	Coarse.	Slack. Currency.
Fairmount Gas Coal Co. of N. Y.	7 50	@— —
Despard Coal Co	$7 50	@— —
Penn	— —	@— —
Newburg Orrel Gas	— —	@— —
West Fairmount Gas Coal	— —	@8 00
AT PHILADELPHIA.		
Powelton		$7 80

Prices of Foreign Coals.

May, 1870.

Duty $1 25 per ton.

Corrected weekly by PARMELE BROS., No 32 Pine street, New York.

Liverpool Gas Caking	$ 8 00@— —
" " Cannel	10 00@12 00
" House "	13 50@15 50
" Orrel	12 00@14 00
Per ton 2,240 lbs., ex-ship.	
PRICES FROM YARD.	
Liverpool House Orrel, screened	$16 00@17 50
" " Cannel, "	18 00@20 00
Per ton 2,000 lbs. delivered.	

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Schuylkill Haven $2 60

From Port Carbon, 8 cents per ton more.

Less drawback of 80 cents on all Coal shipped east of New Brunswick and south of Cape Henry.

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Easton	$ 81
C. R. R., N. J., Easton to Elizabethport	1 12
Shipping expenses at Elizabethport	25
Warfage	10
Total	$2 28

MAUCH CHUNK TO PORT JOHNSON.

L. V. R. R. or L. & S. R. R. from M. C. to Easton	$ 81
C. R. R., of N. J., Easton to Pt. Johnson	1 19
Shipping expenses	25
Warfage	10
Total	$2 35

TO HOBOKEN.

L. V. R. R., Mauch Chunk to Easton	$ 81
Morris & Essex R. R. Easton to Hoboken	1 19
Shipping expenses	25
Warfage	10
Total	$2 35

TO SOUTH AMBOY.

L. V. R. R.	81
B. & D. R. R. / Cam. & Am. R. R.	1 09
Shipping Expenses	25
Total	$2 15

PENN HAVEN TO ELIZABETHPORT.

L. V. RR. Penn Haven to Easton	95
C. RR. of N. J. Easton to Elizabethport	1 19
Shipping expenses	25
Wharfage	10
Total	$2 49

BY CANAL.

Via Schuylkill Canal.

TO PHILADELPHIA.

From Schuylkill Haven	$1 07
" Port Carbon	1 10
" Port Clinton	1 00

TO NEW YORK.

From Schuylkill Haven	$1 70

Via Lehigh Canal.

TO PHILADELPHIA.

Lehigh Canal	$ 0 70
Freight and towage	1 07
Total	$1 77

TO NEW YORK.

Lehigh Canal	$ 40
Morris " / Freight / Towing	1 10
Total	$ 2,50

TO JERSEY CITY.

Lehigh Canal	$ 40
Morris " / Freight	2 00
	2 40
For re-shipment	2 20
Total	$

Via Delaware and Raritan Canal.

TO NEW YORK.

Lehigh Canal	$ 40
Delaware Division Canal	30
Delaware and Raritan Canal	35
Freight	1,25
Towage	20
Total	$ 2,50

TO NEW BRUNSWICK.

Lehigh Canal	$ 40
Delaware Division Canal	30
Delaware and Raritan Canal	35
Freight	1.05
Total	$ 2,10

For Re-shipment—30 extra for shipping, and 10 cents. drawback.

Freights.—MAY, 1870.

TO EASTERN PORTS.

	From Philadel'a.	From Port Carbon & Port Johnston.	From Newburg.	From Rondout.
Amesbury	$2 75	$— —	$	$
Bangor	2 75	— —	1 60	
Bath	2 00	1 80		
Boston	2 60	1 85	1 75	1 75
Bridgeport	1 60	1 00	1 10	1 20
Bristol	2 00	1 40	1 40	
Cambridgeport	2 50	2 00	1 85	
Derby	2 00	— —		
Dighton	1 85	— —	1 45	
East Cambridge	2 50	2 00	1 95	
Fall River	1 75	1 40	1 40	
Hackensack	1 95	1 50		
Hartford	2 75	1 35		
Jersey City	1 75	50		
Middletown	— —	1 25		
Mystic	1 75	1 25	1 30	
New Bedford	1 75	1 40		
Newburyport	2 15	2 00	1 85	
New Haven	1 70	1 00	1 10	1 20
New London	2 00	1 15	1 25	1 30
Newport	1 75	1 40	1 40	
New York	1 25	50	70	
Norwalk	1 70	1 00	1 05	
Norwich and tow	1 70	1 35	1 55	1 40
Pawtucket	1 90	1 50	1 60	
Portland	2 00	1 75		
Portsmouth, N. H.	2 00	2 15	1 80	1 85
Providence	1 75	1 40	1 45	1 45
Rockport	2 10	— —		
Saco	2 30	2 10		
Sag Harbor	2 00	1 40	1 30	
Salem	2 00	1 60	1 75	1 75
Stamford	2 00	1 00	1 00	
Stonington	2 00	1 30	1 25	
Taunton	2 75	2 00		
Warren	— —	1 40	1 45	
Washington	1 10			
TO RIVER PORTS.				
Albany		1 00	- 60	
Catskill		— —	- 50	
Cocksackie		— —	- 50	
Coeyman's		— —	- 75	
Cold Spring		— —	- 35	
Fishkill		— —	- 30	
Haverstraw		50	- 60	
Hudson		— —	- 50	
New York		— —	- 70	
Nyack		50	- 60	
Poughkeepsie		— —	- 35	
Rhinebeck		— —	- 30	
Rondout		— —	— —	
Saugerties		— —	- 40	
Sing Sing		— —	- 75	
Stuyvesant		— —	- 55	
Tarrytown		80	- 75	
Troy		1 00	- 75	
West Point		— —	- 35	
Yonkers		40	- 60	

Foreign and Provincial Freights.

May, 1870.

Foreign.	
Newcastle and Ports on Tyne, per keel of 21 1-5 tons	£14 00@£16 00
Liverpool	12s.6d@14.ton
TO NEW YORK.	
Provincial	
Sidney	$—
Lingan	—
Cow Bay	—
Port Caledonia	—
Little Glace Bay	—
TO BOSTON.	
Sydney	$—
Lingan	—
Cow Bay	—
Port Caledonia	—
Little Glace Bay	—

Towing Rates.

TO EASTERN PORTS.

	Per Ton.
To New Haven	$ 40
Bridgeport	40
Southport	40
Westport	40
Norwalk	40
Stamford	40
	Per Boat.
Greenwich	$70 00
Port Chester	80 00
Mamaroneck	70 00
Glen Cove	

New Rochelle,	55 00
East Chester,	60 00
West Chester,	30 00
White Stone,	30 00
College Point,	25 00
West Farms,	25 00
Flushing,	30 00
Harlem and Mott Haven,	20 00
Port Morris,	20 00
Ninety-first street and Astoria,	16 00

Boats beyond Port Chester, with less than 200 tons, $80 per Boat.

TO RIVER PORTS.

Boats of 150–250 Tons.	Per Ton.
To Manhattanville,	8 cents
Spuyten Duyvil,	8 "
Yonkers,	9 "
Hastings,	10 "
Piermont,	12 "
Dobbs' Ferry,	12 "
Nyack,	14 "
Tarrytown,	15 "
Sing Sing,	16 "
Croton Landing,	17 "
Haverstraw,	17 "
Verplanck's,	17 "
Peekskill,	18 "
West Point,	20 "
Cold Spring,	20 "
Newburgh,	18 "
Poughkeepsie,	22 "
Rondout,	23 "

Boats of 100 Tons	Per Boat.
To Manhattanville, and Return,	$11 00
Spuyten Duyvil, "	13 00
Yonkers, "	15 00
Sing Sing, "	20 00
Peekskill, "	25 00

METALS.

NEW YORK, May 27, 1870.

IRON.—Duty: Bars, 1 to 1½ cents ₱ lb; Railroad, 70 cents ₱ 100 lbs.; Boiler and Plate, 1½ cents ₱ lb; Sheet, Band, Hoop, and Scroll, 1½ to 1¾ cents ₱ lb; Pig, $ ₱ ton; Polished Sheet, 3 cents ₱ lb.

	Store Prices.
Pig, Scotch No. 1, ₱ ton	33 00@38 00
Pig, American, No. 1	33 00@34 —
Pig, American, No. 2	31 —@32 —
Pig, American, Forge	29 —@30 —
Bar, Refined, English and American	— —@75 00
Bar, Swedes, assorted sizes (gold)	85 00@97 50
Bar, Swedes, ord'y sizes, less 5 ₱ ct.	110 —@ — —
Bar, Refined " "	77 50@ — —
Bar, Common " "	72 50@ — —
Scroll " "	87 50@115 —
Ovals and half-round " "	95 —@110 —
Band " "	95 — @ — —
Horse Shoe " "	95 — @ — —
Rods, ⅜ to 5-16 inch " "	85 —@12) —
Hoop " "	105 —@145 —
Nail rod, less 5 ₱ ct.	— 7 @—7½
Sheet, Russia, as to Nos. (gold)	— 10½@—11—
Sheet, Single, D. and T. Common	— 4½@— 5¾
Sheet, Galv'd, Nos. 14 to 26 12 and 14 c. 25@30 ₱ ct. off	
Rails, English (gold), ₱ ton	59 00 @60 00
Rails, American, at Works in Pa.	71 00 @72 00

STEEL.—Duty: Bars and ingots, valued at 7 cents ₱ lb or under, 2½ cents; over 7 cents and not above 11, 3 cents ₱ lb; over 11 cents, 2½ cents ₱ lb, and 10 ₱ cent ad val. (Store prices.)

English Cast (2d and 1st quality) ₱ lb	— 15 @— 18
English Spring (2d and 1st quality)	— 7 @— 10
English Blister (2d and 1st quality)	— 10 @— 17
English Machinery	— 11½@— 14
English German (2d and 1st quality)	— 13 @— 15
American Blister "Black Diamond"	— — @— 12
American, Cast, Tool do.	— — @— 18
American, Spring, do.	— 9 @— 11
American Machinery, do.	— — @— 12
American German, do.	— 9 @— 12

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 20 cents ₱ lb; Manufactured, 45 per cent. ad val.

	All Cash.
Copper, New Sheathing, ₱ lb	— @— 31
Copper Bolts	— @— 31
Copper Braziers, 16oz. and over	— @— 31
Copper Nails	36 @— —
Copper, Old Sheathing, &c., clean	16 @— 17
Copper, Chili Pig	— @— —
Copper, American Ingot	18½@— 19½
Yellow Metal, New Sheating	24 @— —
Yellow Metal Bolts	24 @— —
Yellow Metal Nails	— @— 24

LEAD.—Duty: Pig, $2 ₱ 100 lbs.; old Lead, 1½ cents ₱ lb; Pipe and Sheet, 2¾ cents ₱ lb.

Galena, ₱ 100 lbs.	$— — @— —
Spanish (gold)	6 20 @6 25
German, do.	6 20 @6 37½
English, do.	6 20 @6 62½
Bar (net)	@ 7 70
Pipe and Sheet (net)	— — @ 7 70

TIN.—Duty: Pig, Bars, and Blocks, 15 ₱ cent. ad val.; Plate and Sheets and Terne Plates, 25 ₱ cent. ad val.

	Gold ₱ lb.
Banca	— @44
Straits	35½@36
English	35 @35½

PLATES.

Fair to Good Brands.	Gold.	Currency.
I. C. Charcoal, ₱ box	$8 37½@8 75	$9 75 @10 50
I. C. Coke	7 — @7 75	8 25 @ 9 25
Coke Terne	6 — @6 25	7 25 @ 7 50
Charcoal Terne	7 50 @8 —	9 — @ 9 —

SPELTER.—Duty: In Pigs, Bars, and Plates, $1 50 ₱ 100 lb.

	Gold.
Plates, Foreign ₱ 100 lbs.	$5 00 @6 25
Plates, Domestic ₱ lb.	10 @— 11½

REMARKS.

IRON.—There has been a little more inquiry for Scotch Pig, but as there are several invoices now about due here, lower prices have been accepted, and the market closes unsettled and irregular; the sales are 360 tons Glengarnock at $34@34 50 ex-ship; 50 do. Coltness, $36; and 400 do. Eglinton, $33@33 50 ex-ship, and $35 from store. The demand for American is still light, but prices are unchanged; 500 tons No. 2 Carbon sold on private terms. There is a fair inquiry for Wrought Scrap, and we notice sales of 350 tons from yard, supposed $40. The demand for Rails continues moderately active, and prices remain firm; 2,000 tons new English sold at $62 50 gold, delivered at New Orleans, and 250 do. Old Double-Headed, on private terms. Bar has been a little more inquired for from store, at old prices, which, however, leave little or no profit to the seller.

LEAD.—Pig is steady, though the demand continues moderate; 100 tons soft Spanish sold at $6 25 gold, and 50 do. Domestic at a reserved price. Bar, Pipe and Sheet are steady at $7 70 ₱ 100 lb., net cash.

COPPER.—New Sheathing is steady at 31c., and Yellow Metal 24c. cash. Ingot is quiet, but prices remain steady, with not much offering at the current rates; we notice sales of 100,000 lb. Lake Superior at 19@19½c.; 40,000 lb. do. 19½c.; and 100,000 lb. Baltimore, 18⅛@18⅜c. cash. The purchases for future delivery noted in our last, should have read 300,000 lb., and not 30,000 lb., as misprinted.

TIN.—Pig continues in request and the market still advances, with considerable business at the higher rates; sales have been made of 500 slabs Straits at 35½@35¾c.; 700 do., 36c.; 2,000 do. to arrive, 35½@35¾c.: 50 do. Banca, 44c.; 150 do., to arrive, 40c.; and 12 tons English, 35@35¼c., all gold. The latest telegrams from London quote English 137s., and Straits 134s. 10d. Plates are in more demand at unchanged prices; the sales are 800 bxs. assorted Charcoal Tin at $8 75 for I. C.; 400 do. $8 g2½@ 75; 500 do. ½d X, to arrive, $8 50; 500 do. I. C. Coke, 10 bo 14, $7 62½, all gold; and 1,000 do. ½d X, future shipments, on private terms.

STEEL.—Some parties are asking a small advance on previous quotations for English, but we do not alter our quotations.

SPELTER.—Foreign is neglected, and our quotation of 6@6¼c., gold, is quite nominal.

ZINC.—American Ox. Zinc, 6¼c.; French do., 10½c.; Sheet Zinc, 10@ 11c.

MANGANESE.—Lump, 4½@5c.

Mining Stocks.

NEW YORK, May 26, 1870.

Mining stocks are still further depressed. Sales of Central are reported this P. M. at 20c. @ 21c., and Black Hawk is quoted at 26c. @ 32c. Reference to our quotations elsewhere will give the condition of the market to date.

Petroleum is steady. Sales of Home are recorded at $4 25, and Central at 60c. Below is the latest from the Stock Board:

	Bid.	Asked.
Bennehoff	32	40
Bergen Coal and Oil	40	—
Bliven Oil	45	—
Brevoort	1 00	—
Buchanan Farm	45	—
Central	60	65
Home Petroleum	4 00	5 00
N. Y. & Alleghany	1 95	—
Northern Light	—	—
Pithole Creek	1 40	1 75
Rathbone	30	—
Rynd Farm	32	36
Second National	—	—
Blood Farm	70	—
United Petroleum Farms	24	30
United States	70	—

San Francisco Stock Market.

Mining stocks are much firmer. A telegraphic despatch from the San Francisco Stock Board, dated May 24th, reports Savage at $32 25; Yellow Jacket, $45; and Gould & Curry at $120. Below is the full report of quotations:

SAN FRANCISCO, May 24, 1870.

	1st Board.	2d Board.
Savage	32½	—
Crown Point	18½	—
Yellow Jacket	45	—
Kentucky	51	—
Chollar Potosi	29½	—
Gould & Curry	1 20	—
Ophir	16	16⅛
Alpha	—	—
Belcher	19¼	—
Imperial	38	—
Hale & Norcross	—	—
Amador	200	—

The Slate Trade.

NEW YORK, May 31, 1870.

We have no changes in quotations to note this week, all prices remaining at last week's figures. The trade is very quiet, and nothing going on comparatively. This is owing in a great measure to the dullness of trade in general, which is especially felt by builders. However, as we see signs of better times coming for other branches of business, we hope before long to chronicle a returning activity in the Slate Trade. Prices are now as low as they possibly can be without going below the actual cost of production, and in view of that fact would advise those of our readers who have slate to buy to do so now.

[Corrected weekly.]

Shipments of Slate over the Lehigh Valley and Lehigh and Susquehanna R. R.

For the week ending May 21, 1870.

LEHIGH VALLEY R. R.

ROOFING SLATE.

Girard Slate Co.	70	squares.
Jones & Williams	210	"
Locke Slate Co.	70	"
Lehigh "	105	"
Blue Vein Slate Co.	—	"
D. Thomas	105	"
Kuntz & Woodring	175	"
American "	—	"
Keystone Slate Co.	70	"
Hope "	—	"
D. Williams & Co.	35	"
Jones & Town	35	"
Saylor & Morgan	35	"
Star Slate Co.	—	"
Total	945	"

SCHOOL SLATES.

Lehigh Slate Co.	25	cases.
D. Williams	52	"
Total	77	"

MANTELS.

Lehigh Slate Co.	3	cases.

LEHIGH AND SUSQUEHANNA R. R.

ROOFING SLATE.

Thos. W. Parry	175	squares.
Eagle Slate Co.	105	"
Thomas Buck & Co.	35	"
National Slate Co.	26	"
Continental " "	26	"
Humbach " "	35	"
Total	402	"

	Week.	Previously.	Total for Year.
L. and S. R. R.	402	652	1,054
L. V. R. R.	945	2,900	2,945
Total	1,347	3,552	4,899

French Public Works.

DURING the last seventeen years, under the regime of the late Prefect of the Seine, the city of Paris has expended on extraordinary works alone no less than two milliards one hundred and seventeen and a half millions of francs, or £84,700,000 sterling, of which amount upwards of half, or £43,800,000, has been raised by loan, the remainder having been defrayed out of the ordinary municipal revenues. The interest on the sum borrowed is upwards of 46,000,000 francs, besides which another 10,500,000 is applied towards a sinking fund, and a further 10,000,000 by way of annuities. It results from this, remarks M. LANNAU-ROLAND, who has furnished the foregoing figures to the *Patrie*, that the rebuilding of Paris by Baron HAUSSMANN, so far as it has gone, has imposed upon the city an annual barthen of 67,000,000 francs, to be reduced to 57,000,000 when the annuities have all fallen in; but on the other hand, the annual revenue during the progress of these works has gradually risen until it has attained the high figure of 171,000,000 francs, which is not only sufficient to provide for all these charges, but leaves 37,000,000 francs (about a million and a half sterling) at the disposal of the municipality for new undertakings.—*Engineering.*

An Exhibition Company.

THE late Legislature of New York chartered an organization under the name of "The Industrial Exhibition Company," the objects of which are set forth in the following section of the charter: "The said corporation is hereby authorized to purchase and hold such real estate as may be necessary, and to construct thereon such buildings as may be necessary for the maintenance and carrying on of the business of exhibiting the products, goods, wares and merchandise, machinery, mechanical inventions, and improvements of every nature, name, and kind, and such as are usually exhibited at fairs, and to award and pay to exhibitors therein such prizes and medals and honorary distinctions as they shall deem proper; and to lease, let or own stalls, stands, rooms and places in said building or buildings, upon such terms and conditions as the Board of Directors shall deem best for the interests of said company, and for the promotion of science, art, commerce and literature. And the said company is hereby further authorized to construct studios and picture galleries, and to exhibit therein paintings and statuary of any nature and kind, and to buy and sell such paintings and statuary, and to award such prizes for the creation of the same as such Board of Directors may deem proper; and, generally, said corporation shall have power to carry on in its said buildings, erected for the purposes hereinbefore mentioned, all legal and proper business. And said corporation is hereby further authorized to purchase and hold, by gift, grant, lease or conveyance, any real estate, or interest therein, which shall be necessary or useful for carrying on the business hereby authorized to be carried on by said corporation." The capital stock of the company is to be seven millions of dollars, divided into seventy thousand shares. The exhibition building is required to be fireproof and built of solid masonry.

Coal Beds in Montana.

THE St. Paul *Pioneer*, of a late date, has an article in reference to the extensive coal beds recently discovered near Eureka Gulch, from which we extract the following: "The Chicago *Tribune* says that a letter from D. W. HOBART, of Montana, to OBRINGTON LUNT, of that city, announces the discovery of a valuable bed of coal about half way between Helena and Deer Lodge City. These places are about thirty miles apart, and the location of the coal beds must be in the dividing ridge between the Missouri, on which Helena is situated, and the Bitter Root branch of the Columbia river, on which Deer Lodge is situated. The Northern Pacific railroad will probably traverse a pass of this dividing ridge, called Mullen's Pass, and the coal bed lies within a mile of the line, in case it should be located as proposed at present. This discovery will be a matter of great interest to that important enterprise, for it will render certain an exhaustless supply of fuel, in addition to the interminable forests that line many portions of the route. Other coal discoveries will, of course, follow this, for coal beds are not isolated, but they extend throughout the peculiar geographical formations in which they are found. This bed is six feet thick, and the quality is so good that it is used for blacksmithing and other mining operations through the whole country, within twenty miles of where it is found. The value and importance of the discovery can hardly be over-estimated."

Large Australian Nugget.

THE largest nugget ever found in Gipp's Land, says the *Times*, was deposited in the Bank of Victoria, early in February. The nugget weighed 43 ozs. 3 dwts., and was pure gold of good quality. The finder was a man named Thornton, who was on a "hatting" tour; and the locality of the find was Blink Bonny creek, near Maximilian creek, Freestone. The discovery was quite accidental, as Thornton had no expectation of finding gold where the nugget turned up, and only struck his pick into the ground to ascertain the nature of the soil.

THAT beautiful gem, the emerald, contains the rare earth, glucina, which also exists in the well known, and, in certain localities, somewhat common mineral, the beryl. These two allied substances differ principally in their coloring matters. While that of the beryl is generally supposed to be simply oxide of iron, the brilliant green of the nobler emerald has been shown by Woehler to be due to a certain amount of sesquioxide of chromium and an organic substance which yields carbonic acid when the gem is heated, with access of air. Boussingault has confirmed this observation. The most noted emerald localities are those of Siberia, Muzo (near Santa Fe de Bogota, New Grenada), Hindostan, and Mount Zalora, in Upper Egypt, from which latter the ancients derived their specimens, it being the only locality known to them. Beryls are abundantly distributed—two of the points of its most abundant occurrence being at Grafton and Ackworth, New Hampshire. We have recently obtained some exceedingly large and well-colored specimens from Spottsylvania county, Virginia—a new locality, we believe, to mineralogists. The first-named New Hampshire locality is celebrated for its gigantic crystals, one specimen having been removed which weighed very nearly one and a half tons. Such specimens vastly overshadow in size the valuable emerald. We have, however, record of two of these gems of no inconsiderable weight; one of them in the cabinet of the Duke of Devonshire, and from the New Grenada locality, weighs nearly three-quarters of a troy pound, while a more perfect and flawless crystal in possession of a gentleman of London, weighs six ounces, and cost £500.

Fall of a Meteorite at Mourzouk, Barbary.

M. COUMBARY writes from Tripoli that, on the 25th of December last, there was observed at Mourzouk, (Pezzan) latitude 26° N., longitude 12° E. of Paris (14° 20' 26" E. of Greenwich) a most extraordinary fall of a meteorite, accompanied by a heavy report of an explosion, and so strong a scintillation of sparks, that a group of Arabs, who were near the spot, became so frightened that they fired their guns at the heavenly monster. The Turkish Government has very laudably taken proper measures to secure the meteorite; but, since the distance from Tripoli to Mourzouk is very great, and the roads hardly fit for travel, it is a month's journey to reach the latter place. At the end of this letter it is incidentally mentioned, that in the farther interior of this region (Africa) the Sultan of Wadai, and all the grand personages of his court, are armed with swords, lance-heads and sabres made from iron fallen from heaven, which is very abundant there.—*Chemical News.*

Iron in Caiifornia.

We note that Californians are giving consideration to the iron deposits in the foot hills, and near to the Sacramento, American, Yuba, Feather, Cosumnes, Mokelumne, San Joaquin and other rivers. An interior journal says: "We have the assurances of men, well posted in the iron business, that the foot hills of the Sierra Nevadas, and near to the rivers above named, is equal to any in the world, and, in fact, is not inferior in any respect to the celebrated Juniata ore. Confident that the manufacture of iron in this State will add immensely to the prosperity and welfare of its people, we hope sincerely that the work of exploring and making tests will be continued with unfaltering energy."

A METHOD of protecting iron from atmospheric influences has been proposed by Messrs. Macmillan and McGregor, of Dumbarton and Glasgow. They bring melted sulphur in contact with the cold metallic surface to be coated, when the sulphur chills and sets into a hard, thin, protected covering. The union being a perfect one, and the coating not being subject to oxidation at ordinary temperatures in a moist atmosphere, would seem to give to this method considerable merit. Economy and readiness of application will still further recommend it to a favorable consideration.

Another Iron Steamer.

AT the yard of the Harlan & Hollingsworth Company, on the stocks from which the iron steam collier "Leopard" has just been launched, workmen are already laying the keel for a magnificent new steamer for the Morgan line, larger than the very large iron steamer now on the stocks in the same yard for the line between New York and Charleston. On the last-mentioned vessel rapid progress is being made.—*Wilmington (Del.) Tribune.*

Polytechnic Club of the American Institute.

Meeting held at the Rooms of the Association, May 19, 1870, Professor S. D. TILLMAN in the Chair.

THE President opened the exercises of the evening by reading a paper from Mr. W. W. VANDERBILT, C. E., in relation to a specimen of scale taken from the boilers of the steamship Ocean Queen, which we published in full last week. He remarked that the specimen was of enormous size, weighing over a hundred pounds, too large and heavy to be brought into the room.

Dr. VAN DER WEYDE then gave some information upon ice-making machines. The ammonia machines are very expensive, and there are some very grave objections to their use. When the cooling water reaches the temperature of 80° or 90° they will not work well, owing to the great pressure. It is necessary, therefore, to store in an ice-house the ice made in the cooler portions of the year. This is the plan they have adopted with the ammonia machines in New Orleans. The ice-machine built by the speaker at Paterson, N. J., obviates all these difficulties. In this machine, one of the lighter products from coal oil is used, a liquid called cymogene. Its gravity is 106° to 108° Beaumé. Its boiling point is 26° to 28° Fahrenheit. An abundance of this liquid or gas (for it is a gas at ordinary temperature), is obtained as a waste product in the purification of the coal oils; and it escapes from many of the oil wells in vast quantities. Some of its advantages are, that it takes up a great amount of heat, produces a greater degree of cold than ether, and, at the same time, the vapor is very dense, some six times heavier than air, while the ammonia vapor is lighter than air. The experiments and calculations that were necessary for making a machine that should produce a given amount of ice in a day were then narrated at length, and conclusively showed the value of theoretical knowledge. The trial of the machine took place last week. Owing to accidents, it was late in the evening when the machine was well at work; and Dr. VAN DER WEYDE, after watching the thermometer for about an hour, made a little calculation as to the amount of heat the machine was capable of extracting, and, finding the machine was doing work sufficient to produce the requisite amount of ice, said he was satisfied, and left the place, while those in charge of the machine, not being so strong of faith in the theory, kept on with the work, and three hours later, had proved by experiment that the machine could produce ten tons of ice per day, having done a proportionate part of it in an hour. In answer to questions, the Doctor said, that the freezers were in the liquid cymogene which he had formed and which was colder than the vapor as it expands three hundred times in becoming vapor. He made the pipe for the vapor five inches in diameter, while the tube which conducts the liquid back is only three-quarters of an inch.

Mr. FISHER gave a long and interesting paper upon the steam engine. He advocated high pressure and the double engine. He would have a steam reservoir for the exhaust, and use only two cylinders, contrary to the present English plan to use four. Four cylinders were expensive, and, in this country, at least, the advantage would not equal the extra cost. In speaking of high pressure, he said, we find no difficulties when we come to the actual use of steam at 200, 300, or even higher pressures. Even PERKINS had no difficulties with 1500 pounds to the inch, that could be said to exist at the present time, if he could have obtained the enormously strong lap-welded tubes of the present day, he would have been successful. The timid following of the Cunard practice by COLLINS in the use of the heavy and almost obsolete side-lever engines, was pointed out as one great cause of the loss of our ocean steamship lines.

Dr. VAN DER WEYDE then spoke of the manufacture of glycerine as one of the results of PERKINS' experiments with high pressure steam boilers, and sketched the apparatus upon the board.

Prof. TILLMAN then said the high-pressure engine originated in this country. PERKINS took it to England, and there carried it to its extreme limit. He even produced a steam gun which received much praise.

Mr. FISHER remarked that the fears of high pressure in England were immense. They did not dare to call the locomotive high pressure on this account.

The New York Liberal Club.

Meeting held at the Rooms of the Club, No. 23, Third avenue, May 18, 1870, Mr. HENRY WEHLE in the chair.

DR. OSCAR LOEW, of the College of the City of New York, read a paper on "The Chemical Motions of Matter," the substance of which is the following: Heat, light, electricity and magnetism, which were formerly called "imponderables," are now recognized as only motions of atoms. Such motions may occur in a circular, projecting, or vibrating manner. When motion takes place among the atoms of different elements in one molecule, which is an aggregation of atoms, we have chemical decomposition. The former are physical, these are chemical motions. Life is motion carried out to the most subtile and varying results and effects. Vegetable life consists in a reduction, animal life in an oxidation of matter. What the vegetable builds up from simple combinations, is brought back by the animal to the original simple compounds. Life consists in destruction and renewal. Oxygen is, on the one hand, the sustainer of life, and, on the other, the universal destroyer of organization. The chief elements which enter into the composition of the living body are carbon, hydrogen, nitrogen, oxygen, phosphorus and sulphur. The most wonderful, interesting and important of these is carbon, represented by charcoal, graphite and the diamond. The first four named elements underlie the changes from simple to complex, and from complex to simple compounds, and the solid matter built up from them can be converted into final products which are volatile, and therefore move everywhere with ease. But the case is different with phosphorus, which yields with oxygen the highly important phosphoric acid, and with carbon, nitrogen, hydrogen and oxygen, the important combination known as "protagon." Phosphates are everywhere present in the soil, but in very small quantities. It is important to consider this fact in the economy of nature as well as in political economy. Our bones are built up from the phosphates contained in our bread and milk, while their original source, the earth, becomes poorer and poorer, if it is not properly manured. When our bodies are buried they give back to the earth the elements of our flesh, but not the phosphates of our bones, because there is no volatile compound formed which could escape and give the phosphorus back to the vegetables. The bones remain long after the flesh has decayed; and probably the time will come when we will make a wiser use of those ashes. In this the Hindoos are more civilized than we, for they employ the ashes of their dead to manure their soil, which thus preserves its fertility. Returning again to the original subject, the lecturer stated that these chemical motions are accompanied by endosmotic processes. They are partially physical and partially chemical, those occurring in mankind differing widely from those occurring in mineral matter. In the earliest formation of organisms on our globe, such endosmotic processes played a great part, since mineral deposits took the place of membranes. It is certainly a striking fact that in the rocks of the primary period and in the lava there is no carbon, but only silica, silicates, etc.; in the transition rocks, however, appear at once carbonate of lime, carbonate of magnesia, and carbonate of iron; and it is important to observe that the first organic life appeared where carbonic acid first became fixed in stable combinations. When heated to redness, silicic acid expels the carbonic acid from carbonates; but at a moderate heat, when carbonic acid and water act together on silicates, we find that carbonates are slowly formed and silicic acid is set free. Thus, in this contest between silicic acid and carbonic acid during the cooling period of our globe, we see the starting-point for the first attempt at organization.

At the conclusion of the paper, it was discussed by Messrs. WAKEMAN, ANDREWS, GARDNER, OTT and other gentlemen, and many interesting facts were elicited.

The Need of a Pacific Ocean Telegraph.

LETTER FROM ADMIRAL PORTER.

NAVY DEPARTMENT, May 9, 1870.

Dear Sir: I beg leave to acknowledge the receipt of your letter asking my opinion as to the feasibility of laying a line of telegraph across the Pacific via the Sandwich Islands, or along the Aleutian chain.

Permit me to thank you for the compliment paid me, in asking my opinion of this important enterprise, which I trust may soon be brought to a successful termination.

I feel quite satisfied that your long and successful experience in laying submarine telegraphic cables has taught you how to surmount difficulties of every description, and that there are no greater obstacles in the way of laying a cable across the proposed route than existed in the case of that across the Atlantic, at one time thought to be an impossibility.

The only question now is, whether to lay the cable along the coast and the Aleutian Islands, following the great circle, and shorter distance, or boldly push across the ocean via the Hawaiian Islands, through deeper water, and following the longest route (six thousand miles) over which a cable has yet been laid.

Of the two routes, I prefer the latter.

Honolulu is bound to be the principal stopping-place between China and California, and a point of great importance to American commerce, especially if the Sandwich Islands become, as I have no doubt they ultimately will, a part of the United States. We could not afford to let so important an outpost fall into the hands of any European power, and we must, therefore, of necessity absorb it into the Union, as we have been invited to do on several occasions.

The matter on which you desire information is in regard to the advantage a telegraph from California to China would be to the United States Government.

In the first place, it would give us a continuous line from our country to China, whereas we have not at present an inch of telegraphic cable outside the limits of our territory over which the United States Government has any control whatever. In case we should be involved in a war with England or France as matters now stand, we should be instantly cut off from all telegraphic communication with Europe; but by having a line from the United States to Shanghai or Hong Kong, this could not happen.

At this moment, the expense of telegraphing to China from this country is very great, and the Government is not by any means certain of having its messages delivered in a reasonable time, or of receiving prompt replies.

A message has to be transmitted through so many stations in different languages, that mistakes are almost certain to occur, and these might be of the greatest importance.

It now requires seventy days to obtain an answer to a letter sent by mail to China. Difficulties are continually liable to arise in those distant countries when prompt communications would be required between the Navy Department and the commanders of our naval forces, or between our ministers and the Department of State. These communications should be of a confidential character.

Our small fleet in the China seas has necessarily to be scattered all over the station to enable it to do the work required. In case the vessels were desired to act in concert, it could only be done through the medium of the future American telegraphic cable, which, connecting with the contemplated Russian line to the mouth of the Amoor River, with the line running through the Phillippine Islands, Borneo, Sumatra, Java, Australia, and outlying islands, and with the lines touching at Shanghai, Canton, Calcutta, Bombay, etc., would give our Government the most perfect control over the ships of the Asiatic fleet.

This would be without any expense whatever, as the $500,000 worth of telegraphing proposed to be allowed the United States Government would enable the departments to communicate freely with the commanders and ministers of the East, and it can easily be seen what an advantage this freedom of communication would be to our people in the great race for commercial supremacy in China.

For this supremacy in the East Indies, our people are aiming, and history shows that its attainment has always given great wealth and power to the successful nation.

I have great faith in the future of our country. If you will examine any of the maps of the world on which steam routes are laid down, you will see that they all converge to the natural centre, the United States; and when the proper class of steamers are put on between California and China, the Pacific Railroad will be the great route for travel and trade between Europe and the East.

In a short time, the passage from Canton to England will be made in thirty-two days, passengers and freight stopping at the great emporium, New York, from which telegraphic messages will be sent daily to Japan, China, Australia, etc., etc., when your cable is laid.

This you will witness ere long, and the success of your proposed telegraph will have a great deal to do with accelerating events that will add materially to our commercial prosperity.

I am of the opinion that telegraphic communication between California and China is a *necessity*, and that the sooner Congress takes a substantial interest in the matter, the better it will be for the country.

Our statesmen are now engaged in devising means of resuscitating American commerce, and snatching from the English the supremacy they have gained by permitting Rebel cruisers to fit out in British ports against our mercantile marine.

I am satisfied that we shall succeed in this object, so dear to every American heart, and so necessary to our welfare as a nation.

In connection with this commerce, your telegraphic cable will be indispensable; and, even if Congress gives no aid, it must eventually be established.

In the mean time the country is deprived of certain advantages, and we are consequently losers, and those who do not now feel like taking an interest in the matter will live to regret it.

Very respectfully yours,

DAVID D. PORTER, Vice-Admiral.

CYRUS W. FIELD, Esq., Washington, D. C.

The Mount Cenis Tunnel.

DURING the past year, an advancement of 1.431.45 metres has been made at the Mount Cenis Tunnel; of this, 827.70 metres were driven on the Italian side, at Bardonnèche, and 603.75 metres on the French, at Modane.

The following shows the monthly progress made during the year 1869:

	Progress made at		Total advancement made during month.
	Bardonnèche.	Modane.	
	METRES.	METRES.	METRES.
January	50.90	56.45	107.35
February	60.60	51.75	112.35
March	81.90	54.05	135.95
April	76.75	48.25	125.0
May	71.90	53.70	125.60
June	70.55	45.30	115.85
July	69.10	50.90	120.0
August	68.40	58.25	126.65
September	72.80	58.15	130.95
October	76.40	47.50	123.90
November	66.10	41.95	108.05
December	62.30	37.50	99.80
Lengths driven during 1869	827.70	603.75	1,431.45
Do. do. previous to 1869	5,363.10	3,803.70	9,166.80
Total lengths driven	6,190.80	4,407.45	10,598.25
Remaining to be driven	....	....	1,621.75
Total length of tunnel	....	....	12,220.0

The total length of tunnel completely finished on the 31st of December, 1869, was as follows:

Sonth side (Bardonèche)	5555.20 metres.
North side (Modane)	3669.75 "
Total	9224.95 metres.

The average monthly progress during the past year was 119.28 metres—or 68.97 metres on the Italian side and 50.31 metres on the French; and, at this rate of progress, the time necessary to complete the tunnel would be less than thirteen months, or about the end of January, 1871, and for opening the railway, about six months later.—*Engineering.*

Coal in Brazil.

M. RUDOLPHE VON BEAUSE, a civil engineer, has lately discovered a coal-deposit in the province of Sainte-Catherine, South Brazil, stretching over a district sixty miles in circumference. This coal-deposit, almost on a level with the soil, measures on an average one yard in thickness, and is twenty-one miles distant from the small port of Laguna, from which it is separated by a number of lagoons, which might easily be canalized and connected with each other. This coal is not a lignite, as might be supposed before due examination, but a fine black deposit, of brilliant aspect, schistose in texture, with pseudo-rectangular fractures. Although inferior in quality to the products of British coal-fields, it is superior to those of France or Belgium. This new Brazilian coal-field bears many points of resemblance to the coal-deposits of Eastern Virginia, in the United States, both being of comparatively recent formation when compared with other fields of the great carboniferous system.—*Manufacturer's Review.*

THE ENGINEERING AND MINING JOURNAL.

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ROSSITER W. RAYMOND, Ph. D., Editor,

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WESTERN & COMPANY,
Publishers and Proprietors,
37 PARK ROW,
P. O. Box, 5969. NEW YORK CITY.

Carbolic Acid in Rubber Hose.

THE great value of carbolic acid in the arts is but just beginning to be fully appreciated. Its cheapness and abundance have rendered it a favorite disinfectant, deodorizer, and antiseptic. How it acts in producing these effects is not clearly explained; but of its efficacy there is no doubt; and the new application of it to which we desire to call attention, is but another illustration of its already recognized properties.

The liability of the old-fashioned leather hose to leak under pressure was troublesome enough, even in the days of volunteer departments and hand-engines. But with the introduction of steam fire-engines, which enormously increase both the volume of water thrown and the pressure per square inch on the hose, the leather hose, with their clumsy, rivetted seams, have become well nigh useless. Moreover, aside from actual bursting, there is a forcing of the water into the pores of the leather. It is almost impossible to dry the hose thus soaked; and the very process of wetting and drying, when applied to leather, soon destroys the strength of the material. In cold weather the wet hose freeze; and this not only causes great inconvenience in handling, but also by the expansion of water in the pores, injures the texture.

These evils, discovered in practice, have led to the substitution of rubber hose for those of leather. The rubber hose, as our readers are aware, are made of alternate layers of vulcanized rubber and cloth. As they are seamless, and less permeable to water than leather, they are much superior to hose of the old style; and the number of large establishments now engaged in their manufacture indicates that this acknowledged superiority has become the basis of an extensive and flourishing industry.

But a few years of actual use have considerably abated the enthusiasm with which the rubber hose was at first received. It is found that this material is not perfectly impermeable. Under the enormous pressure now common, it will sweat; water will penetrate the pores; and both from this cause and from atmospheric agencies and changes of temperature, the cloth will be afflicted by mildew, dry and wet rot, and the rubber itself, in the course of time, will become deteriorated or decomposed.

It is at this point that the application of carbolic acid has been so remarkably efficacious. The exact nature of the processes involved in the decomposition of rubber hose is not understood; neither, as we have already remarked, is the action of carbolic acid thoroughly comprehended; but the mysterious remedy is certainly found to cure the inexplicable disease. In truth, this is the sum total of almost all cures; and if it suffices for doctors, why should it not, for the time being, satisfy firemen? Where ÆSCULAPIUS is at fault, surely MOSE need not be over-curious!

We recently examined a piece of stout canvas, which had been dipped in carbolic acid and water, and subsequently exposed to mildew. The carbolic acid being insoluble in water, and the process of soaking having been left purposely incomplete, the cloth was spotted, the darker places indicating where the acid had taken effect, and the lighter ones, where the cloth had been merely wet with water only. The difference in condition was startling. A thread ravelled from a light spot was so rotten as to fall apart in the fingers, while the other end of the same thread, which indicated by its color the presence of the acid, could not be broken by main strength.

Not less decisive is the effect of this agent upon the rubber itself, though this, of course, can only become evident after a considerable time. It then appears that when ordinary vulcanized rubber has become useless, the carbolized material seems to have suffered no change whatever. Possibly a part of this effect is mechanical, and due to the complete permeation of the mass by an insoluble substance; but this hypothesis is insufficient to explain the extraordinary durability of the result.

The Metropolitan Fire Department now uses exclusively hose of this description, made by the Gutta Percha and Rubber Manufacturing Company, which has a patent for the chemical preparation. We observe that the circulars of this company do not say what is the nature of the chemicals employed. It can, however, do the patent no harm to betray, as we have done, the interesting fact that this remarkable result has been obtained by the use of the agent we have named.

It occurs to us that hose of this description would be a great boon to the hydraulic miner. It is not uncommon to find in the great hydraulic claims hose under a head of one or even two hundred feet of water, corresponding with a pressure of from forty-five to ninety-pounds per inch, to say nothing of the momentum, or the enormous strain near the nozzle. Moreover, a leakage or bursting of the hose is more than a mere inconvenience to the miner. It is money running to waste. Every inch of water is paid for; and every inch should do its work.

But our hydraulic miners are too often men who trade with the local dealers only; and few would be so enterprising as to send all the way to New York, just to get a hose that will last longer and wear better than any other. Besides, the overland transportation will add greatly to the cost, and the sizes at present manufactured by the New York company may not suit the case.

We hope the company will act upon the suggestion here thrown out, establish a depot of their wares in San Francisco or Sacramento, ship a large stock of goods around the Horn or across the Isthmus at low rates, and thus give the miners a fair chance to make use of an excellent article without being put to unreasonable cost and trouble.

Railroads in the South.

FEW persons realize with what rapidity the South is recovering from the prostration which followed the war. We have been at some pains to collect direct and trustworthy information with regard to railroad building in that section; and we present the following brief summary, which comprises not more than half of the lines on which constructions are going forward. We wish the South good speed in its new life.

The South Side railroad bridge, over the Appomatox river, near Farmville, Va., is now being erected. The company built a temporary track around the bridge, two and a half miles long, to use during the erection of the superstructure. This bridge is about 2,300 feet long, and the track is 130 feet from the water. When completed, it will be one of the finest structures in the country. The style adopted by General MAHONE, (the President of the consolidated line from Norfolk to Bristol), is the FINK suspension truss, and the work is being done by the Baltimore Bridge Company.

Work has commenced on the extension of the Chesapeake and Ohio railroad, from the famous White Sulphur Springs to the Ohio river, and it is expected that the line will be open in about two years. This will give rail communication from the Atlantic to the Pacific (from San Francisco to Norfolk) under the control of the great Pacific railroad companies.

Track laying has commenced on the East Tennessee and Western North Carolina railroad, from Johnson's Depot, in East Tennessee, to a connection with the Western North Carolina Railroad, which will soon open up a rich mineral region.

Arrangements have been consummated which will insure the completion of the great Air-line railroad from Atlanta to Charlotteville, a distance of about 200 miles. This will then be the shortest line between Mobile and New York.

The Savannah and Charleston railroad has been rebuilt after its long disuse, (since its destruction during SHERMAN's campaign), and is now doing a regular business.

The Macon and Brunswick railroad, from Macon, Georgia, to Brunswick, on the coast, has been in operation for several months. It is 180 miles long, and runs through a rich timber country. Brunswick is the only deep-water harbor between Norfolk and Pensacola, with the exception of that at Hilton Head, which is not at present accessible from the interior.

The road from Port Royal (or Hilton Head) is slowly progressing. When finished, it will afford another outlet to the coast for the products of Carolinas and North Georgia.

Work is progressing rapidly towards completion on the line from Macon, Georgia, to Augusta. It will be finished this summer. The bridge over the Ocmulgee, at Macon, is nearly finished. This line passes through Milledgeville, and will effectually shorten the time between Mobile and New York, via Richmond. The grading was done by the State Penitentiary force, at an enormous profit to the contractors. It is asserted that Governor BULLOCK and other State officers are interested in the contract for the leasing of the Penitentiary hands.

The Albany and Brunswick Railroad Company has completed its first fifty miles, and seems determined to go ahead and finish the remainder. Its connecting lines to Eufaula and Mobile will soon be under way; and these roads will afford a new route from New Orleans and Mobile to the Atlantic coast. Colonel NELSON TIFT, of Albany, is working energetically to increase the prosperity of his section, by putting these lines in a fair way of completion.

The South Georgia and Florida railroad will be completed this month. It connects Albany with Thomasville, on the Atlantic and Gulf railroad, and runs through a splendid cotton country.

The Savannah, Griffin and North Alabama railroad, running from Griffin, Georgia, on the Macon and Western railroad, to Decatur, Alabama, is under construction. This will open a direct line from Memphis to Savannah, leaving Atlanta sixty miles to the northward.

The Savannah and Memphis Railroad Company have closed a contract to complete their road in two years. It runs from Opelika, Alabama, to Tuscumbia, Alabama, and gives a direct line from Memphis to Columbus, Georgia. The distance is over 200 miles, and the north-western part of the line will pass through the mineral regions of North Alabama, which are unsurpassed in their wealth of iron and coal

The Stetefeldt Furnace.

PRIVATE letters lately received by us from Austin confirm fully our confidence in the success of this furnace. We learn that Mr. STETEFELDT can hardly get assistants enough to supply the demand for superintendents of the construction of his furnaces in different localities of the State of Nevada. He is personally superintending the one now building at the Manhattan Mill, Austin; and two assistants, Mr. MOELLER and Mr. WEBERLING, are preparing the drawings for two more, to be erected immediately at White Pine and Mineral Hill. Mr. STETEFELDT is crowded with applications for other Nevada districts.

This state of affairs is gratifying to us, not only on account of Mr. STETEFELDT, who fully deserves the success he now meets, after many protracted experiments and frequent disappointments, but also and principally, on account of the bright future of the mining interest of Nevada, that is promised by this prompt recognition of the fruits of a thorough metallurgical training. The peculiar circumstances surrounding silver mining in Nevada must be understood and appreciated to fully realize the benefit bestowed on that country by this invention. Scarcity of fuel and high prices for labor and materials were the worst enemies to the great majority of Nevada silver mines. Only those which carried ores of a richness unheard of in other countries could possibly pay by the old, reverberatory process of roasting. The introduction of STETEFELDT's roasting process brings at once within the scope of profitable working a vast number of mines, which, though they might be called rich in other countries, have been regarded poor in Nevada, on account of the high prices of reduction. This is equivalent to trebling the amount of the legitimate mining business carried on in the territory so far. We may therefore look for great activity in Nevada during this summer, and a largely increased production of bullion for the future. In Colorado, we are informed, the agent of Mr. STETEFELDT has not met the success, so far, that the invention deserves. But we are not surprised at this. The Coloradans have been so fearfully victimized during former years by "processes and inventions," that even their generous, open-hearted, and confiding Western nature is now, as it were, hermetically sealed to all outside proposals and scientific solutions of problems. They want to see the new invention work and succeed under their very eyes, before they touch it, and we cannot but find this entirely natural under the circumstances. Perhaps Mr. STETEFLDT will be willing to erect one of his furnaces in Georgetown at his own cost, and convert the not entirely unwilling miners of that skeptical territory.

The Calaveras Skull—Letter from Professor Hitchcock.

TO THE EDITOR: Sir—Having noticed two or three references in your editorials to the "Calaveras skull" of California, I thought I would like briefly to give you the conclusions I had reached on the subject, which satisfied me perfectly, though others may not be so affected. The conclusions were reached by a careful perusal of the manuscript of Professor WHITNEY's papers, examination of the specimen, and hearing the two discussions over it at Chicago and Northampton, besides tracing to their sources some of the false stories about the skull, that have appeared in the papers.

The specimen is genuine. This is shown by the presence (jammed into it) of the same gravel which comes from the mine; by the agreement of all the questioners on both sides, that it was obtained by the same person. It is on both sides agreed that he did not know what he had, as it was covered with earth, only he thought it might be something curious. It is also agreed on both sides that he kept it one or two years before taking it to any one else. He does not seem to have kept it because he thought it valuable, but rather because he hoped it might be valuable, if some one else should come along who wanted it.

It is clearly associated with pliocene fossils, and must be very ancient; but the California pliocene is not necessarily older than the drift or glacier deposits of the East and of Northern Europe, as might at the first blush be inferred. There was no drift-period in California—as, for some reason, the glaciers did not extend much west of the Missouri river, (excepting only local glaciers, of no account.) Hence, the flora and fauna of the pliocene continued to live on beyond the drift-period into the alluvial. An example is afforded by the big trees which grew east of the Rocky Mountains, in the miocene and pliocene. In the East they became exterminated on account of the glacial cold; in California, on the contrary, as the cold did not make its appearance, the animals and plants continued to live on—some of them to the present day. Hence, it is no criterion of antiquity greater than that of the glacial period, to say that a human skull came from the California pliocene. It may not be 6,000 years old—at least, judging from the biological associations of this venerable Indian. The Table mountain beds are all of older date. These "skull beds" lie along ancient valleys, newer than the Table mountain deposits, as is shown both by fossils and by stratagraphical structure.

These views satisfy me that we may accept all the facts

brought out by Professor WHITNEY, but that the owner of the skull was a modern animal, and not so terribly old.

C. H. HITCHCOCK.

HANOVER, N. H., May 23, 1870.

It is unfortunate that, in the investigation of such a question, there should be any "sides," in a partisan sense. The desire to uphold any particular theory as to the antiquity of man by establishing or overthrowing a certain piece of evidence, is likely to disturb the spirit of impartial and critical inquiry, which alone can determine the value of the evidence. The facts upon which Professor HITCHCOCK bases his acceptance of this relic as genuine, do not appear to us conclusive; and the storage of the skull for so long a time by a person who did not value it, nor know what it was, would tend to cast doubt upon the details of its discovery, even if there were no fraud, or suspicion of fraud, in the case. Every mining engineer knows that he cannot rely upon evidence furnished by specimens of ore which have been "lying around loose" for months or years. The presumptions in such a case may be in favor of the genuineness of the specimen; but the certainty is not great enough to justify the expenditure of capital; and where money would not be risked, we think the opinions of philosophers should not be rashly given. The Calaveras skull must be put on the shelf until its declarations are corroborated by other witnesses.

Professor HITCHCOCK opens a very important train of thought in calling attention to the uncertainty of all conclusions as to the synchronism of formations in different parts of the world, based on the similarity of leading fossils, or even on stratigraphical evidence, when this is not continuous. The differences of opinion among geologists as to certain cenozoic groups on the Pacific slope, leads us to the suspicion (to use no stronger term) that the boundaries between the cretaceous and tertiary, and between the different sub-divisions of the latter, are not well defined in that region. In fact, it is with the book of nature as with that of revelation: our divisions into chapters and verses are to a considerable extent arbitrary, and sometimes spoil the sense.

Gabbro.

THE substance which has recently acquired a considerable reputation under this name in Germany is by no means the rock so called, but a preparation of pulverized soapstone, dressed clay, etc., used extensively of late for the manufacture of articles of art, such as statuettes, busts, reliefs, vases, and many others. The excellent soapstone from the mines near Wunsiedel in Northern Bavaria has long been manufactured on a large scale into gas-burners, for which purpose this material is exceedingly well adapted, on account of its being quite an indifferent conductor of heat, and also on account of the hardness it assumes after burning. In the manufacture of these gas-burners by Mr. J. VON SCHWARTZ in Nuremberg, a great deal of the soapstone was wasted for years, as it fell from the turning lathes in the shape of powder and small pieces. Lately, however, the ingenious proprietor of this manufactory has commenced to introduce into the market beautiful articles, such as we mentioned above, which are made from the former refuse, with clay, and possibly some other ingredients not now made public. The composition has been patented by him, and the articles made are reported to be extremely hard and firm after burning, possessing at the same time a beautiful and agreeable color. The "Gabbro" being entirely weatherproof, it is also proposed to use it for architectural ornaments, floors, large statues for parks, etc.

We have given this information to our readers in view of the extensive deposits of soapstone and the finest serpentine throughout the Atlantic States, some of which are even in the immediate vicinity of New York city. Most of the deposits have only been drawn upon thus far to a limited extent, on account of the fire-proof qualities of the rock; but, according to the above, they may be really the bases of an important industry, capable of extension in numerous directions.

Coal in British America.

THE enthusiastic letter of Mr. CAMPBELL to the London *Mining Journal*, which we publish in another column, is intended to show that Great Britain will rely at some future day on the vast basin of true carboniferous coal which stretches through the centre of her American possessions. Mr. CAMPBELL does not appear to have seen any of this coal; or, at least, he does not succeed in impressing us with any idea other than a certain daring conclusion, that where there are rocks of the carboniferous era there must be coal. Even the latter premiss is not very clearly shown. Our own geologists declare that there is no true coal west of the Missouri. Carboniferous rocks, in the geological sense, there are; but they belong to deep-water strata. However, Great Britain could not maintain her manufacturing and commercial supremacy by importing coal from Prince Rupert's Land, even if it were to be found there. When the home mines are exhausted, the home manufacturers must cease; and the scepter be surrendered into younger and stronger hands.

The Empire Mine, of Grass Valley.

WE notice that this celebrated mine has changed hands, a San Francisco gentleman being the purchaser. This change was attended also with the retirement of Captain S. W. LEE, who has been superintendent for many years. Captain LEE's bold and determined behavior at the time of the miners' strike, last summer, marked him as a man of great firmness and courage, and the history of the mine under his administration is highly creditable to his skill and judgment. He is succeeded by Mr. J. F. NESMITH, a highly intelligent and reliable gentleman, who has been for some years associated with the management of the company as its secretary. We trust that he will be able in the future to even eclipse the glories of the past.

Uniform Railroad Gauge.

THE subject of a uniform gauge for American railroads is again agitated. Experience seems to have pronounced the "narrow gauge," of 4 feet 8½ inches, the one best adapted to satisfy both the comfort of passengers and the requirements of economy in management. The broader gauges, though they are delightful to travellers, are found to be costly in operation; while the very narrow gauges, though recently shown to be highly profitable, where the traffic is light, will of course never come into use upon lines which possess or are expected to possess a large business. The medium above mentioned is already in use upon five-sixths of the railroads in this country; and it is estimated that the expense of altering the rest to conform to it will not exceed $500 per mile.

Lithofracture.

THE Missouri *Republican* describes, at some length, the experiments recently made by the American Iron Mountain company, in blasting ore with a newly invented material under the above name. Large masses of iron ore were blown to pieces with great ease, and the usual astonishment was depicted on the faces of the spectators. "Lithofracture" has the consistency of dough, and the charges seem to have been pretty large—two or three pounds being used at each blast. The most complete shattering in the case, to our minds, is that which the inventor has wrought in the unfortunate languages welded together in the barbarous name of his mixture. For the sake of scholarship, it were well for this new comer to die young; if it is to live, we hope it will be re-baptized.

The Minnesota Mine.

THIS mine, which was opened in 1845, and has continued to be worked ever since, was closed, probably not to be opened again, on the 28th of April. Its history for the quarter of a century during which it was actively operated, presents many points of interest. Until its period of discouragement began, some six years ago, it was, perhaps, the leading copper mine of Lake Superior, having paid, on an original outlay of a little more than $60,000, dividends amounting to $1,750,000. It need scarcely be added, that the stockholders upon whom the subsequent heavy losses fell, were not the same as those who for many years pocketed the profits.

The New Welder.

THE account in another column, describing the marvellous performances of a new flux for welding, restoring and rendering homogeneous iron and steel, borders on the marvellous; but half the marvel consists in the careful suppression of the facts as to the nature of the material employed. We are told much about its wonderful effects, nothing about its composition and nature. Until these particulars are made known, it is useless to do more than gape (partly in wonder, partly perhaps in weariness) over the stories of its performances.

New School of Practical Metallurgy.

As will be seen under the head of instruction in our advertising columns, Prof. E. N. KENT, formerly of the United States Assay Office in this city, offers to receive pupils for private instruction in practical chemistry and metallurgy. This opportunity may be welcome to those whose age or occupation prevents them from entering upon a prolonged course of study at any public institution.

The Hudson and East River Tunnel.

THE proposition now before Congress to grant to a number of prominent capitalists the right to establish tunnel communication under the Hudson and East rivers, thus uniting Jersey City on the one side and Brooklyn on the other, has created a good deal of public interest on the subject of submarine tunnels, and excited some discussion among engineers as to their practicability. On this subject the opinions of engineers abroad seem to differ as much as those of engineers at home. It is universally conceded that tunnels can be built without serious difficulty, but much doubt is entertained as to whether they can be made sufficiently useful and profitable to justify their construction by private corporations. Sir I. BRUNEL's famous Thames tunnel was certainly a practical failure financially, but the new work under that river, opened recently by a few unostentatious experiments, is said to realize the best expectations of those interested in its construction. In many important particulars, the plan adopted in the construction of this important work might be followed with advantage by the engineers of similar works in this country. The access to the tunnel on either side is gained by means of "lifts." That on the north side is sixty feet deep, while that on the south side is only fifty feet deep. The lifts, which are described as much like railway coaches in general appearance, are constructed to accommodate seven passengers, although they will hold ten comfortably. The motion of the lift is smooth and regular, and a system of mechanical clips is provided, by means of which, in case of accident either to the main chain or to the machinery below, the lift would be let down easily at a slower rate than the engine would lower it, and anything like the precipitous fall of a lift is entirely impossible. At the bottom of these lifts are plain, light, wrought-iron omnibuses, or railway carriages, capable of accommodating eighteen or twenty persons, in which the passage of the tunnel is made. The tube is constructed at an incline of one foot in thirty to midway beneath the river, when it rises again at the same gradient. At each end is placed a small stationary engine, which winds in a wire rope, to which the carriage is attached. For one-half of the passage the descent by gravity leaves the engine nothing to do but draw in the slack of the rope, and it is said that the impetus of the carriage carries it so far forward up the inclines, that it is only when within a few feet of the waiting-room chamber, that the engine is used to draw the carriage at all. On the opening day, the passage was made from Tower Hill to Tooley street in sixty-five, sixty-eight, and seventy seconds. Counting from the time of starting to the lfft which brought the visitors to the surface, the whole journey was made within two minutes. The motions of the car are described as sliding and gentle, without perceptible vibration, either in the vehicle or the tunnel—the latter fact having been ascertained by satisfactory tests, which proved that the entire structure was as rigid as a solid bar of iron. The passage of the carriage through the tunnel creates a sufficient draft of air to insure ample ventilation in all parts of the work.

We can see no reason why the establishment of several such tunnels from convenient points along our river fronts to Jersey City, Hoboken, Staten Island, Brooklyn, and Williamsburgh, would not be found largely profitable. During the greater part of the day and evening, the ferries to these points are inadequate to the accommodation of the travel and freight carried by them, and facilities of tunnel communication might be established for both passengers and freight, without rendering any of the existing ferry lines unprofitable. In many respects, tunnels are superior to suspension bridges, being much cheaper and less liable to injury if properly constructed. There is nothing chimerical in the proposition to tunnel the East and North rivers, therefore, and as the enterprise is in good and responsible hands, we trust it will be carried to a successful issue without unnecessary delay.—*Iron Age.*

Dredging after Blasting.

A NOVEL and successful mode of submarine blasting is thus described by Mr. COLLINGWOOD, Assistant Engineer East River Bridge, in the *Franklin Institute Journal* for May: In preparing the river bottom for the reception of the "caisson," there developed, shortly after the dredges were put to work, an exceedingly hard ridge of material through the centre of the proposed excavation. The ridge was composed of boulders of all sizes, imbedded in a compact clay. On this the dredges could make no impression, and it was determined to try blasting in the following manner: A solid bar, eighteen feet long and five inches in diameter was shod with a steel point, and a ring was attached to the upper end of the bar for convenience of handling. The bar was driven, by means of an ordinary pile-driver, down to the desired depth—when withdrawn, a hole was left the size of the bar, in which was placed a tin canister containing about thirteen pounds of powder, which was done by means of a driver in submarine armor. The charge was fired by means of a battery, resulting in the displacement of a large quantity (comparatively) of material. The experiments with a single bar proved so successful that two other bars were procured, one of which was six inches in diameter, and both twenty-two feet long. By means of these additional piles, two pile-drivers and crews, one diver and an assistant, from twenty to forty blasts per day were effected at a depth of eighteen feet below mean high tide.

After the bottom had been gone over in this way the dredges would excavate, in a single day, from fifty to one hundred and twenty yards of material. It will be noticed that there is a large economy in the above method of submarine blasting over drilling. Occasionally a pile would get immovably fast between the boulders, when it had to be loosened by adjacent blasting. Without having tabulated the items of expense, it is supposed that the cost of moving the material will not exceed four dollars per yard, and possibly not three dollars.

Light Locomotives.

A MODIFICATION of a valuable machine is often superior to a new invention. In the great national work of improving navigation at the rapids of the Mis-issippi at Keokuk, three small locomotives are in successful use. Every one is familiar with machines of the ordinary size, but these are a novelty. They require but a very light rail, will easily turn on the sharpest curves, and pull cars up heavy grades. There is no new principle involved in their construction, but this adaptation to special purposes and light work is new. These locomotives have of late attracted a great deal of attention from owners of coal and ore lands, stone quarries, and lumber districts, and from contractors for large works, the Messrs. SHANLY having one at the Hoosac tunnel. As light as four tun engines of this style are now in operation.

The importance of machinery to aid in developing the resources of our country, makes any such improvement a matter of deep and general interest. England, Russia, and Austria have for years been investigating the subject of narrow-gauge railroads and cheap motive power, and it is gratifying to know that simultaneously this practical test has been going on in our own land, and success proved beyond a question. The immense outlay required to develop property not lying on some railroad or river has hitherto deterred owners from working even very rich tracts, but this cheap way of employing steam will greatly help them in new as well as in old portions of our country to make their property available. The manufacturers, Messrs. SMITH & PORTER of Pittsburgh, are making this work a specialty, and are sparing no pains to insure the success which they certainly deserve.—*New York Tribune.*

Malleable Cast Iron.

A FRENCH patent was recently accorded Messrs. J. E. POULET, E. NAGAUT & Co. for a new method of rendering cast iron malleable.

Instead of the ordinary heating for many hours of the cast iron articles, packed with iron-scale, in iron boxes, they propose to dip the cast iron into a vitreous mass, consisting of silica, soda or potash, and alumina or lime, in which oxide of iron (preferably specular iron), or an iron ore containing manganese is dissolved. Of course the mass must be more easily fusible than the cast iron, and the difference of fusibility as great as possible.

MINING COMPANIES AND STOCK QUOTATIONS.

GOLD AND SILVER COMPANIES.	SITUATION OF MINE.	SECRETARY AND PLACE OF BUSINESS.	CAPITAL.	PAR VALUE.	OFF'R'D.	ASKED.
Alameda Silver		A. Queran, 108 Wall st	$2,000,000	$10 00		
Ada Elmore	South Boise, Idaho					
American Flag	Nevada District, Col	P. P. Fullerton, 71 B'way	600,000	10 00		
Atlantic and Pacific	Humboldt Co., Nevada.					
Bates and Baxter	Colorado			50 00		
Benton	Colorado	W. F. Drake, 15 Broad	500,000	5 00		10
Briggs	Colorado	J. P. Davies, 19 Cliff	1,000,000	100 00		
Black Hawk	Colorado	C.T.Whittington, 48 Broad	2,500,000	100 00	30	50
Bobtail	Colorado	J. Stanton, Jr., 25 Nassau	1,000,000			
Bullion Consolid'ed Gold	Colorado					
Burroughs Gold	Colorado					
Central Gold					19	23
Consolidated Gregory	Colorado				1 60	1 75
Combination Silver	Nevada			100 00	50	
Columbia Silver	Austin, Nevada	J. M. Brown, 155 B'way	5 000,000			
Commercial Silver		J. E. Smith, 26 Pine	3,000,000			
Corydon	Gilpin Co., Colorado	J. Samuels, 40 B'way	500,000			
Downieville	Colorado		2,500,000	25 00		
Eagle Gold	Gold Dirt Dist., Col	J. P. Davies, 19 Cliff	300,000	1 00		
Empire Gold and Silver	BodieBluff,MonoCo.Cal	H. K. Gates, 70 B'way	1,000,000			
Edgehill		A. Fullerton, 71 B'way	10,000,000			
Esperanza Silver		Ezra Clark, Jr., 13 William	400,000			
Fisk Gold		H. Johnson, 195 Fulton	500,000			
Forest Queen		E. B. Beet, 62 B'way	1,000,000			
Golconda Gold	Sherbrooke, C. E	H. Adams, 71 Broadway	2,000,000			
Gunnell Gold	Colorado	J. H. Rolston, 80 B'way	1,000,000	50 00		
Gunnell Central	Colorado	C. B. Bostwick, 16 B'way	3,000,000	10 00		
Gold Rock		R. M. Lockwood, 93 Wall	400,000			22
Grass Valley						
International Silver		J. W. Brazier, 26 Pine	600,000			
Hope Gold	Colorado		5,000,000			
Holman			2,000,000	25 00		
Kipp & Buell	Colorado		300,000			
Knickerbocker Gold		J. H. Rolston, 80 B'way	200,000	100 00		
La Crosse Gold	Nevada Dist., Col	P. P. Fullerton, 71 B'way	1,000,000		9	12
Lander Hill T. & S	Nevada	M.L.Catherwood,74 B'way	1,000,000			
Lewis Gold	Georgia		1,000,000			
Liberty Gold					01	02
Manhattan Silver	Nevada	M. L. Ogden	400,000			
Maraposa common	California	Jas. H. Ferdon, 34 Wall	12,000,000		7½	8½
Mariposa preferred	California	do. do.			17½	17¾
Montana Gold		G. De Cordova	400,000			
Montana M. L. & M. Co.	Montana	A. M. Hoyt, 22 William	250,000			
Montrose	Clear Creek Co., Cal	W. W. Perkins, 71 B'way	1,000,000			
New York Silver	Nevada	Thos. Sproull, 78 B'way	1,500,000			
New York and Austin	Nevada	E. R. Siccomb, 70 Wall	500,000			
New York and Owyhee	Owyhee Co., Idaho		1,000,000			
New York and Eldorado		G. H. Munroe, 10 Wall	2,000,000			
N. Y. & Montana M. & D.	Montana	F. A. Chapman, 20 Nassau	1,250,000			
N. Y. & Silver Peach	Nevada	R. C. Root, 74 B'way	2,000,000			
N. Y. & Utah P. & M		W. H. Mailler, 108 Wall				
Nye						
Ophir Gold	Comstock Lode, Nev	L. C. Warner, 70 B'way	625,000			21
Owyhee Gold		W. H. Smith, 43 Ex. Place	1,700,000			
Pahranagat Central	Nevada	J. E. Smith, 25 Pine	6,000,000			
Quartz Hill Gold		F. Bernard	2,500,000		25	26
Reese River Consol'd	Nevada	W. B. Ogden	6,000,000			
Rocky Mountain	Colorado	S. M. Pond, 70 B'way	500,000	10 00		
Rollins Gold		Thos. Bond, 132 B'way	600,000			
Sensenderfer	Colorado	H. A. Shewill, 19 Broad	1,000,000		1 00	
Silver Bend		F. W. Macy, 20 Nassau	1,500,000			
Silver Mt. Silver		H. A. Moen, 71 B'way	1,000,000			
Silver Peak & R. M	Nevada	W. B. Ogden, 52 Wall	5,000,000			
Smith & Parmelee	Colorado	W. H. Hollister, 6 Broad	2,500,000	20 00	1 25	1 40
Social & Steptoe Con		T. H. O'Connor, 24 Nassau	450,000			
Standard Gold		C. B. Bostwick, 169 B'way	500,000			
Symonds Forks						75
Twin River Silver	Nevada	J. F. R. Hadden, 20 Nassau	800,000	100 00		
Texas Gold	Colorado		500,000	10 00		
Union Gold	Colorado	F. A. Potts, 110 B'way	1,200,000			
Wash. Mill & Silver	Nevada	W. W. Perkins, 71 B'way	300,000			
Wauba Yuma	Arizona	J. W. Silsby, 36 Pine	6,000,000			

COAL AND IRON COMPANIES.	SITUATION OF MINE.	SECRETARY AND PLACE OF BUSINESS.	CAPITAL.	PAR VALUE.	OFF'R'D.	ASKED.
American Coal Co		M. A. Myers, 119 B'way	$1,500,000	$25 00		
Ashburton Coal Co		J. T. Rollins, 41 Pine	2,500,000			
Block House Coal		D. B. Keeler, Jr., 43 Pine	1,000,000			
Brewster Iron		H. Robison, 165 B'way	150,000			
Broad Top Coal & Iron Co	Pennsylvania	B. Love	2,000,000			
Cameron Coal Co.		J. A. Simpson, 40 B'way	2,500,000			
Carbon Hill Coal Co		J. Silsby, 36 Pine	1,000,000			
Central Coal		F. P. White, 111 B'way	2,000,000	100 00		
Clifton Iron Co		P. H. Riordan, 34 Pine	1,250,000			
Columbia Iron		E. D. Webb, 77 Cedar	1,000,000			
Consolidation Coal	Maryland	J. S. Mackie, 71 B'way	5,000,000			
Crawford Coal		E. Clapp, Prest, 137 B'way	1,000,000			
Cumberland C. & I. Co		E. Kisean, 90 B'way	5,000,000			45
Derby Coal Co		W. S. Davison, 11 Broad				
Dover Coal and Iron Co		L. Chase, 88 Wall				
Del. & Hudson Canal Co		R. H. Nodyne, 7 Nassau	15,000,000	100 00	100	
Ebervale Coal		G.L.Stout, Treas., 111 Br'y	500,000			
Fall River Bituminous		D. T. Blauvelt, 43 Pine	1,000,000			
Farrar Coal		C. H. Jones, 43 Pine	250,000			
Fisher Iron Co		M. Ellis, 19 William	100,000			
Hamp're & Balt. Coal		S. M. Pond, 70 B'way	500,000			
Iron Cliffs Co		C. J. Canda, 52 Wall	1,000,000			
Jackson Iron		G. P. Loyd, 119 B'way	300,000			
Kemble Coal & I. Co		R. A. Wight, 26 Ex. Place	300,000			
Keokuk Coal		J. F. Franklin, 112 B'way	100,000			
Lackawanna I. & C	Pennsylvania	E. C. Lynde, 52 Wall	1,200,000			
Lewis Run C. & I. Co		C. A. Sanborn, 80 B'way	750,000			
Lykens Val. Coal Co		F. A. Platt, 13 William	800,000			
McKean Co. Bit. Coal Co		J. H. Rolston, 80 B'way	1,500,000			
Lehigh & Susquehanna		E. W. Cark, Philadelphia, Pa			1 60	
Mahanoy			400,000	100 00		
McNeal C. & I. Co		C. C. Godwin, 71 B'way	500,000			
Mount Riga Iron		G. M. Newton, 42 Cedar	300,000			
New Boston Coal		C. H. Ogden, 55 B'way	2,000,000			
N. Y. Con. C. & I. Co		A. T. Levine, 16 Wall				
N. Y. & Lehigh Coal		T. Simpson, 111 B'way	150,000			
Pacific Coal Co		G. Wrighton, 34 Wall				
Peekskill Iron Co		W. Murdock, 7 Nassau				
Pennsylvania Coal Co		E. H. Mead, 111 B'way	3,200,000	50 00		
Richmond Iron Co		C. H. Smith, 165 B'way	1,000,000			
Scotia Coal Co		I. N. Soper, 42 B'way	2,500,000			
Spring Mt. Coal		C. Runyon, 111 B'way	1,250,000			
Springfield & D'p Run C.		E. D. Webb, 77 Cedar	600,000			
Stout Coal Co		G. S. Comstock, 111 B'way	500,000			
Susquehanna & Wyoming		E. Potter, 40 B'way	1,000,000			
Tannerdale Coal		I. T. Ludlaw, 71 B'way	250,000			
Wash. Mutual Coal		M. C. Baker, 117 B'way	420,000			
West Point Iron Co		R. C. Brock, 110 B'way	500,000			
Wilkesbarre C. & I. Co		W. H. Tillinghast, 80 Br'y	3,400,000			
Wyoming Val. Coal Co		E. Potter, 40 B'way	1,000,000			

COPPER AND LEAD COMPANIES.	SITUATION OF MINE.	SECRETARY AND PLACE OF BUSINESS.	CAPITAL.	PAR VALUE.	OFF'R'D.	ASKED
Anita Copper	California	J. A. Ferguson, 8 Wall				
Corinth Copper	Corinth, Vermont	S. H. Howard, 191 B'way	$500,000	25 00		
Davidson Copper						
Eagle Harbor Copper	Michigan	W. H. Smith, 43 Ex. Place	500,000	25 00		
Evergreen Bluff Copoer	Michigan	F. W. Caper, 44 Ex. Place	500,000	25 00		
Globe Copper		R. K. Rickard, 19 Nassau	200,000			
Grand Portage Copper Co		A. S. Kellogg, 22 Pine	500,000			
Guymard Lead		Samuel Vernor, 38 Pine				
Hilton Copper		W. H. Smith, 43 Ex. Place	500,000			
Hope Copper		J. W. Davis, 19 Nassau	500,000			
Hudson River Copper	New York	T. Clarkson, 22 William	1,500,000			
Indiana Copper Co		J. M. Mills, 25 Nassau	500,000			
Isle Royale Copper	Michigan	F. W. Caper, 44 Ex. Place	1,000,000			
Keweenaw Copper	Michigan	F. W. Caper, 44 Ex. Place	500,000			
Lake Superi'r Silver Lead	Michigan	A. S. Kellogg, 22 Pine	1,000,000			
Omiga Copper	Michigan	S. Cooper, 7 Pine	500,000			
Ridge Copper	Michigan	J. L. Gardiner, Jr., 43 Ex. P.	500,000			
Rockland Copper	Michigan	A. Fullerton, 71 B'way	500,000			
St. Joseph Lead	Michigan	J. W. Jones, 6 Broad st,	1,000 000			
St. Marguret Copper		E. P. Sutton, 43 Pine	250,000			
Schoolcraft Copper		R. Walsh, 22 William	500,000			
Superior Copper	Michigan	A. Fullerton, 71 B'way	500,000			
Union Copper		A. S. Kellogg, 22 Pine	500,000			
Vermont Copper	Vermont	J. C. Ely, 191 B'way	500,000			10
Wallkill Lead, asst		S. M. Pond, 70 B'way				

MISCELLANEOUS.	SITUATION MINE.	SECRETARY AND PLACE OF BUSINESS.	CAPITAL.	PAR VALUE.	OFF'R'D.	ASKED.
American Zinc Co		W. E. Lawton, 19 Cliff	$1,000,000			
Bigelow Blue Stone Co		H. Bogardus, 14 Pine				
Quicksilver						
Covill B. L. M. & M'f. Co		C. R. Bostwick, 302 Pearl	250,000			
Manhattan Marble		H. K. Gates, 70 B'way	300,000			
N. Jersey Zinc Co	New Jersey	A. H. Farlin, 61 Maiden L'e	1,500,000			

Narrow Guage Railway Cars.

In an account of the progress of the works on the Toronto, Gray and Bruce Railway, the Toronto (Canada) *Globe* says: Respecting the cars a considerable amount of misconception is prevalent. The term (narrow guage) has led many to believe that the cars will be thin, narrow things, capable of holding nothing at all. But this is altogether a mistake. The cars will be only one foot narrower than the ordinary car; that is, eight feet instead of nine, so that the difference is very little after all, whilst the loss of width is in a great measure compensated for by the fact that the narrow guage car will weigh fully three tons less than that of the broad, a consideration of very material importance in the hauling of a train. The cars will be thirty-one feet in length. Owing to the difference of width, the arrangements of the passenger cars are considerably modified. The thing is somewhat difficult to describe without a plan, but then it may be illustrated thus: On entering the car on the right are seats, each capable of accommodating two passengers, on the left are seats for one. Halfway down the arrangement is altered—the seats for two are on the left and, and those for one on the right, and at the point where the alteration occurs a space is left for the stove. The arrangement is exceedingly ingenious, and will not produce the slightest inconvenience.

MISCELLANEOUS.

NOVA SCOTIA.

GOLD MINE FOR SALE.

The Subscriber will sell at Public Auction, at the Merchants' Exchange Reading Room, in the City of Halifax, on WEDNESDAY, the 1st day of June next, at 12 o'clock:

The Gold Mine and Plant in the District of Lawrencetown, lately owned by Glasson and Strange, consisting of—

1st. One hundred and twenty-nine first-class areas, numbered as follows, viz: from 51 to 61; from 140 to 161; 243 to 258; 343 to 359; 438 to 463; and 538 to 550, all inclusive, in the original block; and from 395 to 406, 495 to 506, all inclusive, in block No. 5. Many veins have been discovered on this property, all gold-bearing, but only two tested. One of these is a continuation of the vein discovered on the opposite side of the lake by Messrs. Waddelow, from which the present proprietor, James Carson, Esq., of New York City, has taken perhaps the richest rock that has been found in the district. It has been sunk on about 15 feet, a few tons of quartz raised, and a test gave 16 dwts. ($16) to the ton. The other vein tested is fed by twelve tributary veins, and two shafts sunk on it, one about 45 and the other about 112 feet deep. In the first gold was struck at 35, and in the second at 55 feet deep. A test at the Montague mills gave a few grains over one ounce to the ton, and the last rock taken from each shaft was the best. In parts this vein is very thick, at the thickest only the width of the shaft (5 feet) being taken out. There are other feeders or tributary veins that will come into it at a still greater depth, one of them, 5 feet thick, will come into the seam at 180 feet depth.

2nd. Lease of Water Power for 21 years, with privilege of renewal. This furnishes a good power within 100 feet of the main shaft.

3rd. Mining Plant, consisting of Shaft House, Blacksmith Shops and tools, Frame for Flume, and Building for Driving Machinery, Mining Tools, &c.

4th. Quartz raised on the ground, estimated at about 500 tons. A good route for a road from the mine to the public highway has been surveyed and laid out by order of the Government.

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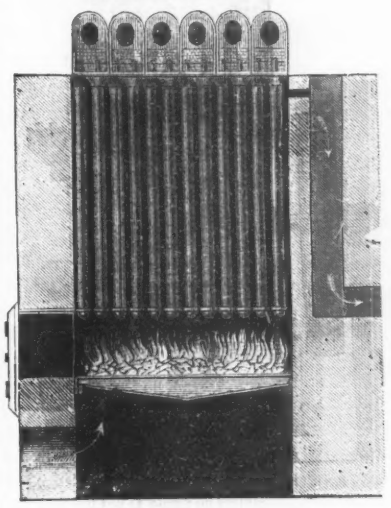

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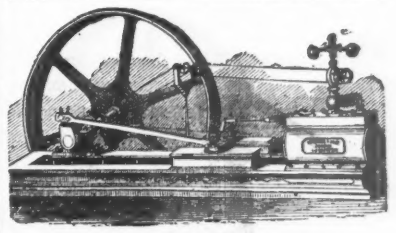

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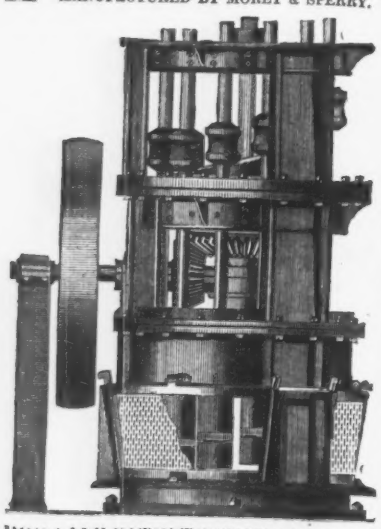

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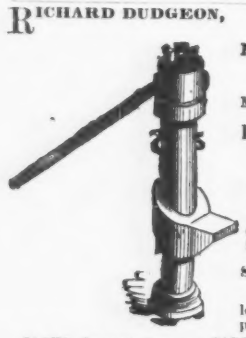

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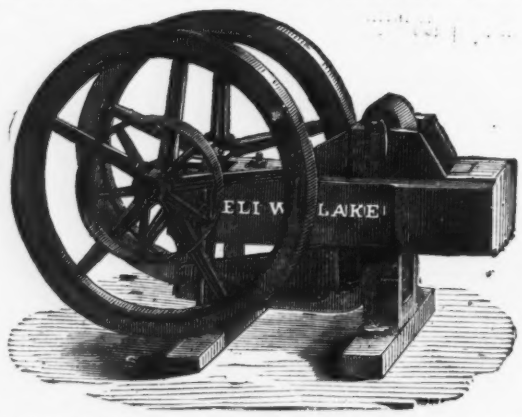

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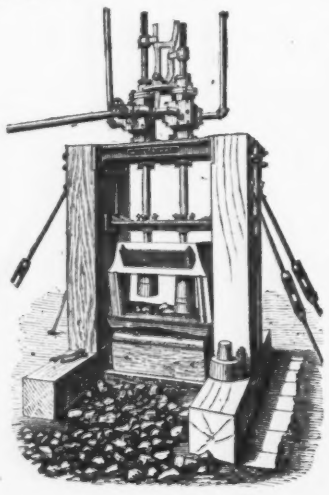

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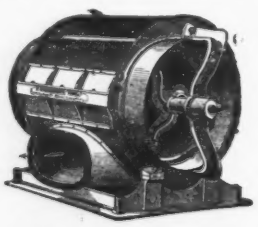

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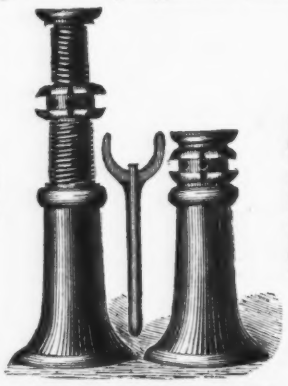

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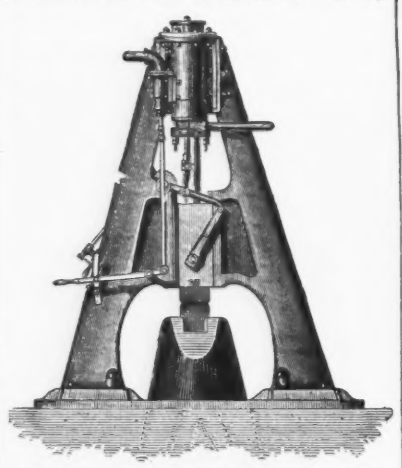

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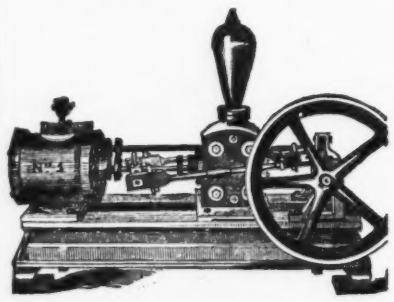

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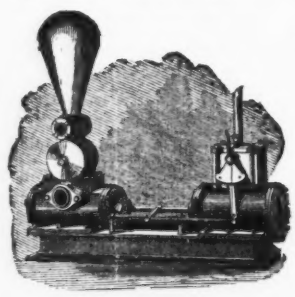

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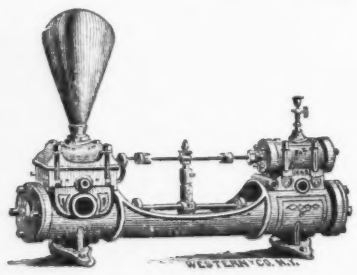

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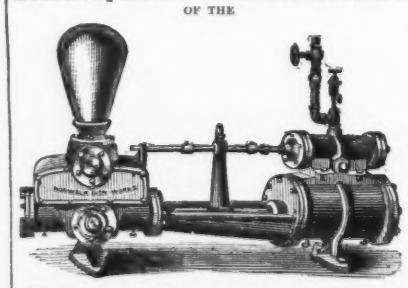

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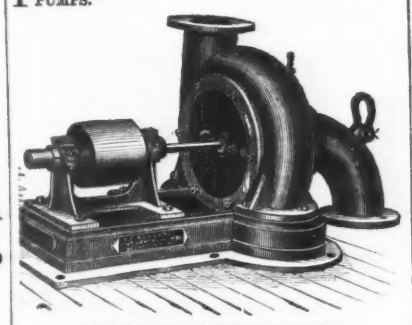

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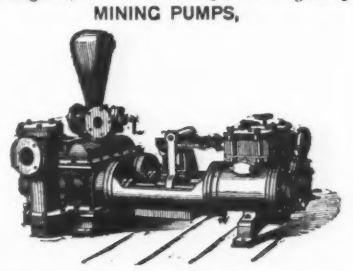

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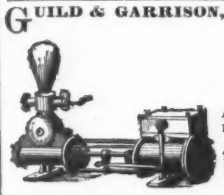

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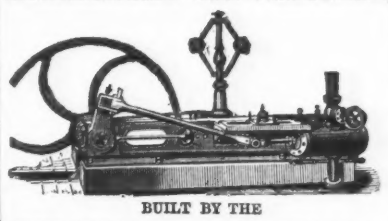

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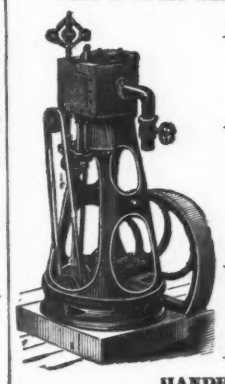

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